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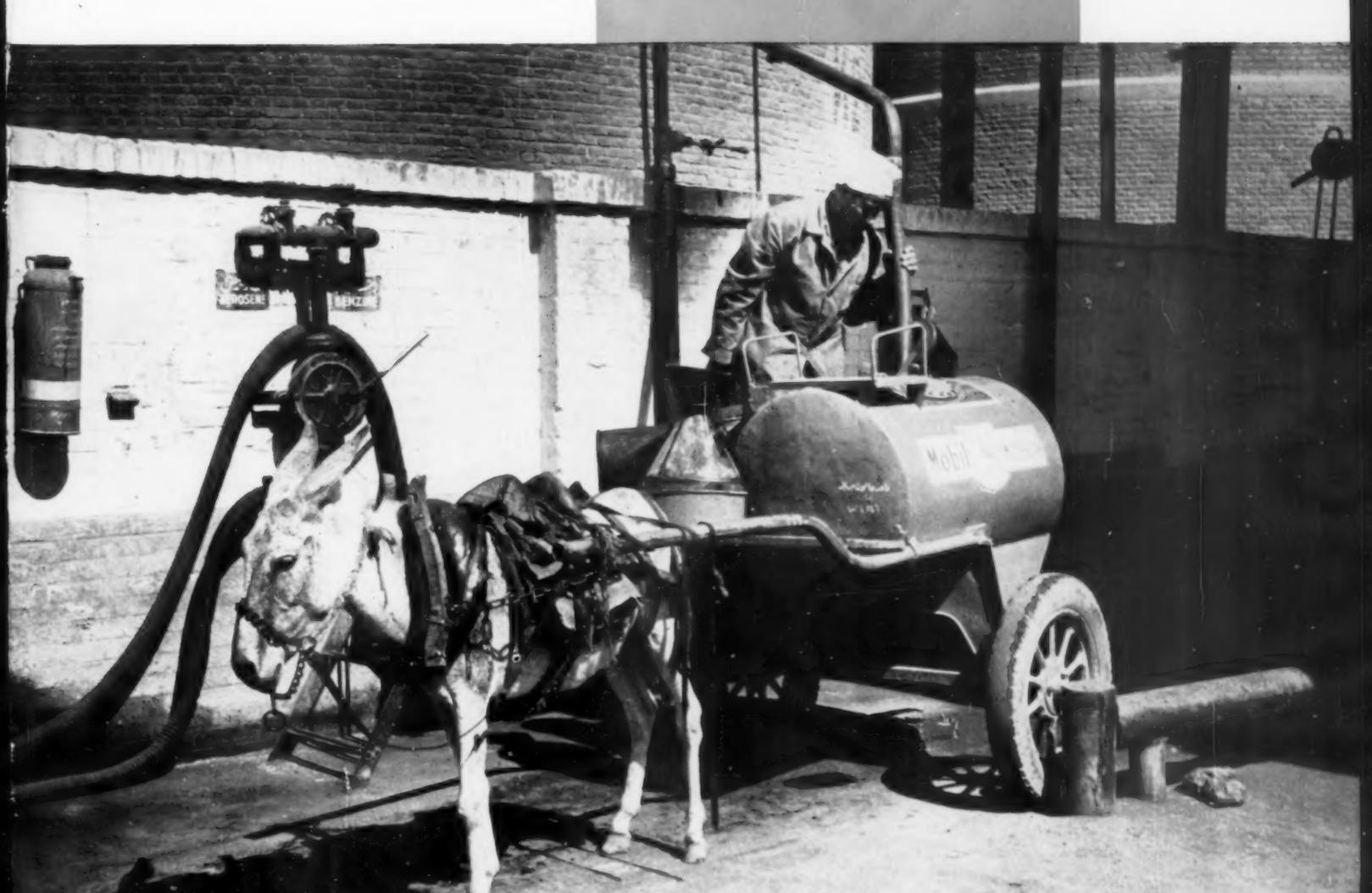

JANUARY 1961

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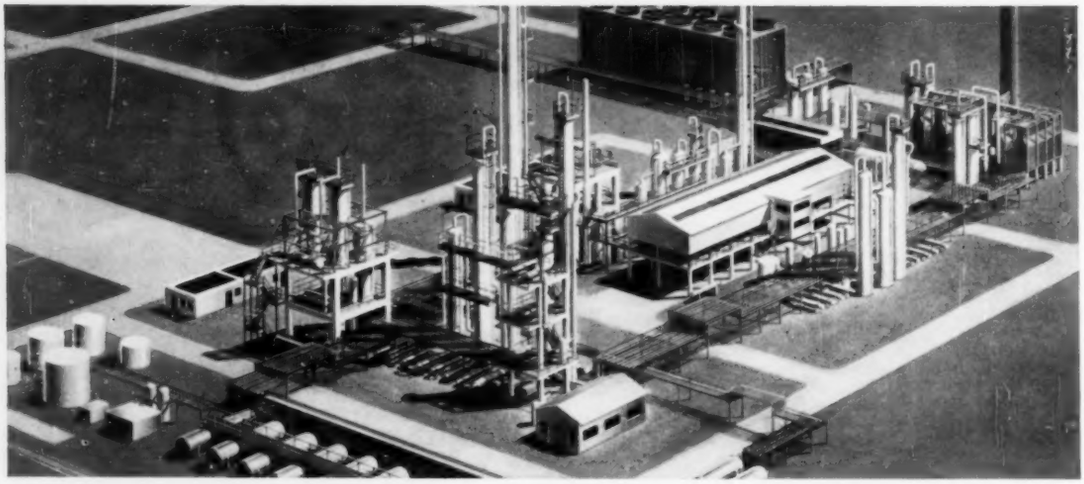

The Lummus Company has been awarded the contract to design, engineer and construct a $20 million ethylene and ethylene oxide plant for SunOlin Chemical Company at Claymont, Delaware.

The plant is scheduled to go on stream late in 1961, and will have a design capacity of 225,000,000 lbs. of ethylene and 55,000,000 lbs. of ethylene oxide per year. Existing facilities will be modified to permit production of 12,000,000 cubic feet of high-purity hydrogen and up to 1,000,000 cubic feet of carbon monoxide per day.

The new units will be located at Claymont, Delaware, adjacent to the Sun Oil Company's Marcus Hook Refinery which will supply the raw material for the plant.

A substantial portion of the products produced will be used to supply the requirements of major chemical companies in the area. To permit efficient delivery of ethylene and other petrochemicals, a multiple pipe line crossing will be laid under the Delaware River from the site to serve customers in the expanding Southern New Jersey industrial area.

The remainder of the production will be used in the manufacture of products marketed through existing sales outlets of Sun Oil Company and Olin Mathieson Chemical Corporation, the joint owners of SunOlin.

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VOL. 32, NO. 1, JANUARY, 1961

World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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THIS MONTH'S COVER

One donkeypower tank wagon being loaded with kerosine at a Stanvac bulk plant at Bombay, India, for door-to-door delivery. This bulk plant will be operated by Esso Eastern, Inc., a Standard Oil Co. (N. J.) subsidiary, when division of Stanvac's properties is completed. Photo by Elwood M. Payne.

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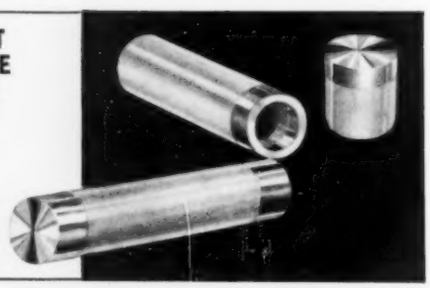

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by Joseph B. Huttlinger

Defense Oil Purchases Down

The Department of Defense, which bought 696,000 barrels of oil products daily in the fiscal year that ended last July 1, will be buying slightly less in the years to come.

This, at least, is an estimate of military officials as disclosed by Rear Admiral O. P. Lattu, executive director of the Military Petroleum Supply Agency. He foresees requirements by years as follows:

	Barrels Daily
Fiscal 1961	670,000
Fiscal 1962	687,000
Fiscal 1963	678,000
Fiscal 1964	677,000

Over the next four years, demand for aviation gasoline will drop from 100,000 b/d in fiscal 1960 to 86,000 b/d by 1964.

The entire drop is foreseen in avgas 115/145, which represents 82% of military avgas purchases today.

Jet fuel use will rise, however, from 329,000 b/d to 339,000 b/d, with JP-5 rising from 16,000 b/d to 19,000 b/d and all other from 313,000 b/d to 320,000 b/d.

Motor gasoline use also is to rise from 45,000 b/d in fiscal 1960 to 48,000 b/d by fiscal 1964. Combat grade motor gasoline will rise from 27,000 b/d to 29,000 b/d, and all other from 18,000 b/d to 19,000 b/d.

Diesel use also is to rise from 52,000 b/d in fiscal 1960 to 56,000 b/d in 1964, a rise chiefly accounted for arctic grade oil. Other distillates will stay at 15,000 b/d. Navy Special fuel oil will drop from 118,000 b/d in fiscal 1960 to 94,000 b/d in fiscal 1964. Other residual will rise from 37,000 b/d to 39,000 b/d.

Military Petroleum Supply Agency bought 264,259,000 barrels of petroleum products in bulk in the year ended last July 1, at a cost of $1,031,684,000, it is announced. MPSA bought another $47,125,000 in packaged petroleum products. MPSA also paid out $13,882,000 in service contracts for petroleum storage, into-plane servicing and other service contracts. Some $817,716,000 of the purchases were within the U.S., 19.8% of these from small business. Jet fuels accounted for nearly 47% of the cost.

Oil Investment Rises Abroad

The U.S. petroleum industry is spending about $1.6 billion to add to plant and equipment outside the United States this year, it is reported in the Survey of Current Business, a U.S. Department of Commerce publication. This compares with $1.6 billion in 1959; $1.9 billion in 1958, and $2.3 billion in 1957, it is reported.

The industry is spending another $400 million for exploration and development, a relatively stable outlay year after year. Companies are spending $390 million in Canada this year in capital outlay, more than in any single country. Last year, the total was $378 million, in 1958 it was $510 million and in 1957 it was $584 million.

Venezuela is receiving $230 million this year, against $290 million last year, $430 million in 1958 and $849 million in 1957.

The Middle East is receiving $124 million this year against $129 million last year, $189 million in 1958 and $144 million in 1957.

The United Kingdom is receiving $99 million this year against $99 million last year, $124 million in 1958 and $94 million in 1957.

U.S. oil companies are putting $90 million into North Africa against $36 million last year, $18 million in 1958 and $13 million in 1957.

They are investing $60 million in Germany against $59 million last year, $84 million in 1958 and $49 million in 1957.

They are putting $41 million in France, the same as last year, against $84 million in 1958 and $46 million in 1957.

The petroleum industry used $1,196 million of net income, $528 million from the U.S. and $248 million in funds from outside the U.S. as well as $914 million in depreciation and depletion in 1959, to finance the capital

Pipeline

and other outlays, the department said. These add up to $2,886 million.

Uses of these funds was given as $1,554 million for property, plant and equipment; $8 million in drop in inventories; $65 million in receivables; $189 million in other assets and $1,086 million in income paid out.

Esso Can't Fire Him

Esso Division of Humble Oil and Refining Co. is caught between the devil and the deep in the case of one of its lessee dealers at Portsmouth, Va.

Esso officials feel he keeps a "very dirty" station, and they do not want him to continue as an Esso dealer, they say.

Yet, when they refused to renew his lease, the dealer, F. H. McCain, cried the action was because he had complained about certain Esso policies to the U.S. Department of Justice.

It is illegal for a company to retaliate against a dealer solely because he has filed a legitimate complaint. Such action would be punishable by a fine of $5,000 or five years in prison or both.

While Esso officials insist the non-renewal had nothing to do with the complaint, U.S. antitrust officials raised questions about the action. So did Rep. James Roosevelt, D., Calif., chairman of a House Small Business subcommittee on gasoline dealer problems.

Upshot was that Esso gave the dealer a second hearing before a company appeals board and then extended his lease for six months—until April 15. Then, chances are, the matter will come up again.

Mr. Roosevelt and antitrust division officials feel they must protect a witness or else no one will ever give them facts. Esso feels that if this dealer can stay on although he keeps a "very dirty" station, any dealer can obtain virtual immunity from being canceled out by the mere fact of filing a complaint.

Navy Wants Oil Bids

Military Petroleum Supply Agency insists it was right in asking and awarding bids for three years to supply Navy Special fuel oil.

It sees evidence that the long term contracts are "more attractive to industry in certain cases," and cheaper for government.

MPSA made awards to Richfield Oil Corp. for six million barrels for $13,620,000, and the Union Oil Corp., for 5,475,000 barrels for $12,428,250.

The contracts which start January 1, 1961, have prices that escalate. Both contracts are for firm quantities. But both the government and the refiners have the right to cancel upon six months notice. Aim is to aid West Coast refiners and supply MPSA at "reasonable prices."

Gas and Rail Roads

The fight for a natural gas bill goes on, although informed persons see little chance of any measure being completed this year.

Latest group to jump in is the National Association of Railroad and Utility Commissioners, which has agreed that some legislation is needed to avoid chaos at the Federal Power Commission.

The NARUC measure would ease up some FPC controls over independent producers of gas, but not remove them. In fact, some of the proposals promise to stir up opposition of independent producers.

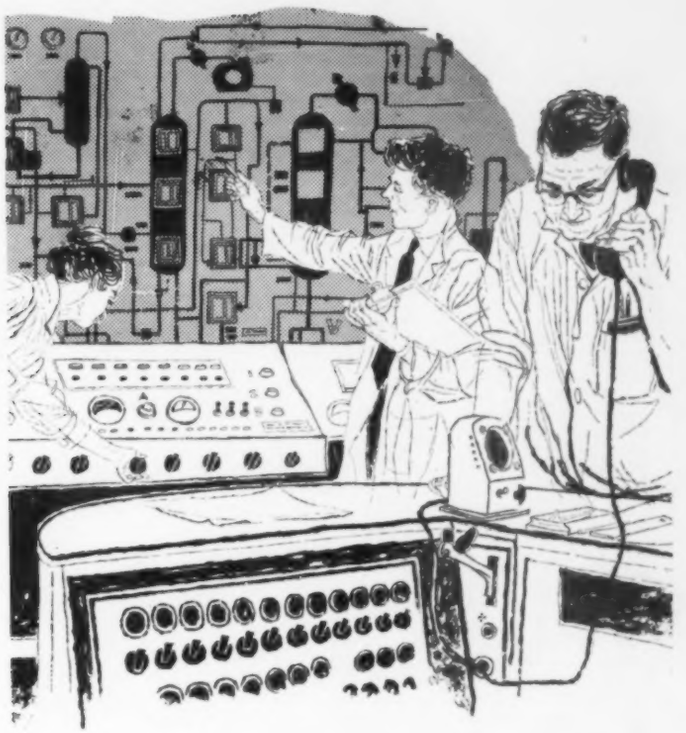
The NARUC measure would provide:

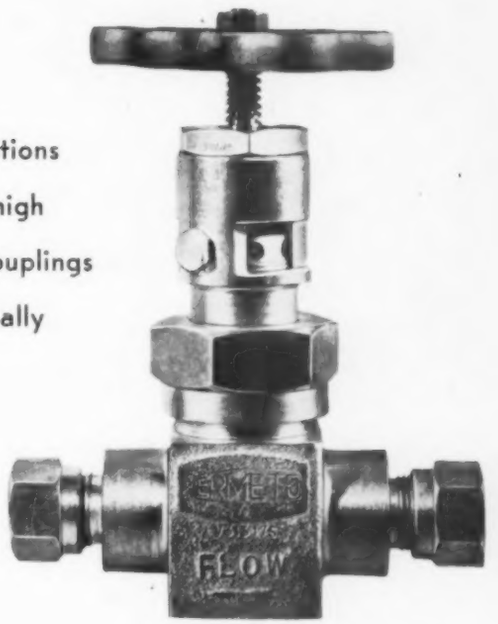
1. A ban on favored nation, spiral escalation and other "indefinite pricing clauses" in gas purchase contracts. This is little change from the present, as these are outlawed by FPC practice.

2. FPC may suspend rate increases on gas for industrial use only, a change from the present, sought by the FPC and others.

3. A pipeline company or producer may not put into effect a rate hike on top of another that is yet to be approved by the FPC.

(Continued on page 6)





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4. No certificate to sell gas shall be given until and unless the FPC finds the price is in the public interest.

5. A speedup in FPC work, by providing that hearings once started shall be completed in one year. An examiner would be given six weeks after the close of a hearing or after the filing of briefs to hand down his decision. The commission would be held to three more months to act.

Sen. John A. Carroll, D., Colo., told a Senate subcommittee hearing he sees no chance of a gas bill in 1961, that the FPC should do its best control prices under the present setup, that it should ask Congress for more money to do the job, that the FPC has failed to do right by the American people as it failed to find a workable method of controlling field prices of gas, and that the commission's system of area ceiling prices for gas is likely to be struck down by the courts.

Washington vs. Depletion

More than any other single person, Sam Rayburn of Texas is responsible for keeping the 27.5% income tax depletion allowance for crude oil and natural gas production on the statute books.

As Speaker of the U.S. House of Representatives, further, he is widely recognized as the second most powerful man in Washington.

Therefore, his views of the depletion allowance are worth hearing. In a rare interview, with *U.S. News and World Report*, he had this to say:

"A great many people when they talk about depletion allowances think only about oil. There are 104 things that have depletion allowances and these seem to be everything except air and water.

"Everything in the ground or dug out of the ground has some kind of depletion allowance on it. Now, I think we ought to look into it and see if there are loopholes where some are escaping taxes that ought to pay more and, if somebody is paying too much tax, we ought to change that, too. I think it is just as much of an injustice for a man to pay too much as for him to pay too little.

"We are going to look into these things thoroughly, but I don't think the oil people have any cause to fear the 27.5% depletion allowance is going to be disturbed. It has been in effect for 34 years and Democrats have been in control of Congress for 28 of those 34 years. If we had wanted to do anything about it, we would have done it a long time ago. I don't look upon the oil depletion allowance as a loophole."

New Imports Study

One of the first things the new administration faces in oil is a restudy and overhaul of the entire oil imports program.

This becomes clear with the latest effort to haul down the total of imports to the U.S. starting in January of this year.

During oral hearings on the proposal, witnesses brought up new areas for study of the program that were not touched upon in the proposal for the outback.

All in all, the effect of the hearing is to indicate the need for a thorough overhaul of the present program.

This is not to say that anyone wants to tamper with the present total of imports allowed. This is regarded as in the ballpark, although importers would like to bring in more, and domestic producers want less.

Nor is there much sentiment for controls on imports by source. U.S. officials seem perfectly willing to leave it up to importers where they shall obtain their foreign oil.

What would be studied in any new look are features such as these:

1. The floor for some 20 historical importers, who are not to be cut below 75.5% of their imports under the voluntary program a few years ago. Should this be stopped?

2. The sliding scale used to divide up the allowed total of imports among various refiners. Under the sliding scale, smaller refiners are given a larger percentage of their runs in imports than larger refiners, an obvious bonus to the smalls. Shall the sliding scale go?

3. The question of any quota at all to inland refiners who are unable physically to use the imported oil, but can make a few dollars by exchanging the imported oil for domestic crude.

4. The yardstick for measuring the total of crude oil imports allowed. At present, it has been a percentage of total demand for all products, but domestic producers want it related to domestic crude oil production. Then, the domestics say, we would avoid today's situation where residual demand increases and natural gas liquids output jumps, so crude imports rise, while domestic crude output is steady or down.

5. The Canadian exemption is generally applauded in the U.S., but domestic producers want the Canadian oil counted in the allowed total; so, if oil comes in from Canada, less oil would come in from other areas.

6. Whether the program should set a national total of imports for all of the U.S. instead of for Districts I through IV on the one hand and District V on the other hand. Setting the two ceilings becomes complicated when oil moves from District V to the other districts.

7. Oil product quotas are in need of an overhaul both as to a method of setting the allowed total, and of parceling out that total among individual companies. Now, the total allowed is the total that came in in 1957, and only those who brought in oil then can bring it in now. This shuts the door to changes in market factors and to newcomers.

8. Residual oil imports are allowed in as needed to meet demands, and a figure is set each three months as to the allowed imports. This total then is divided up among those who imported in 1957 on a prorate basis, thus closing the door to newcomers.

Other areas of the program are likely to need study, but these are felt to be in most serious need of attention. Officials say the program, which began nearly two years ago, was relatively simple and workable, but now that it is under way, refinements are needed.

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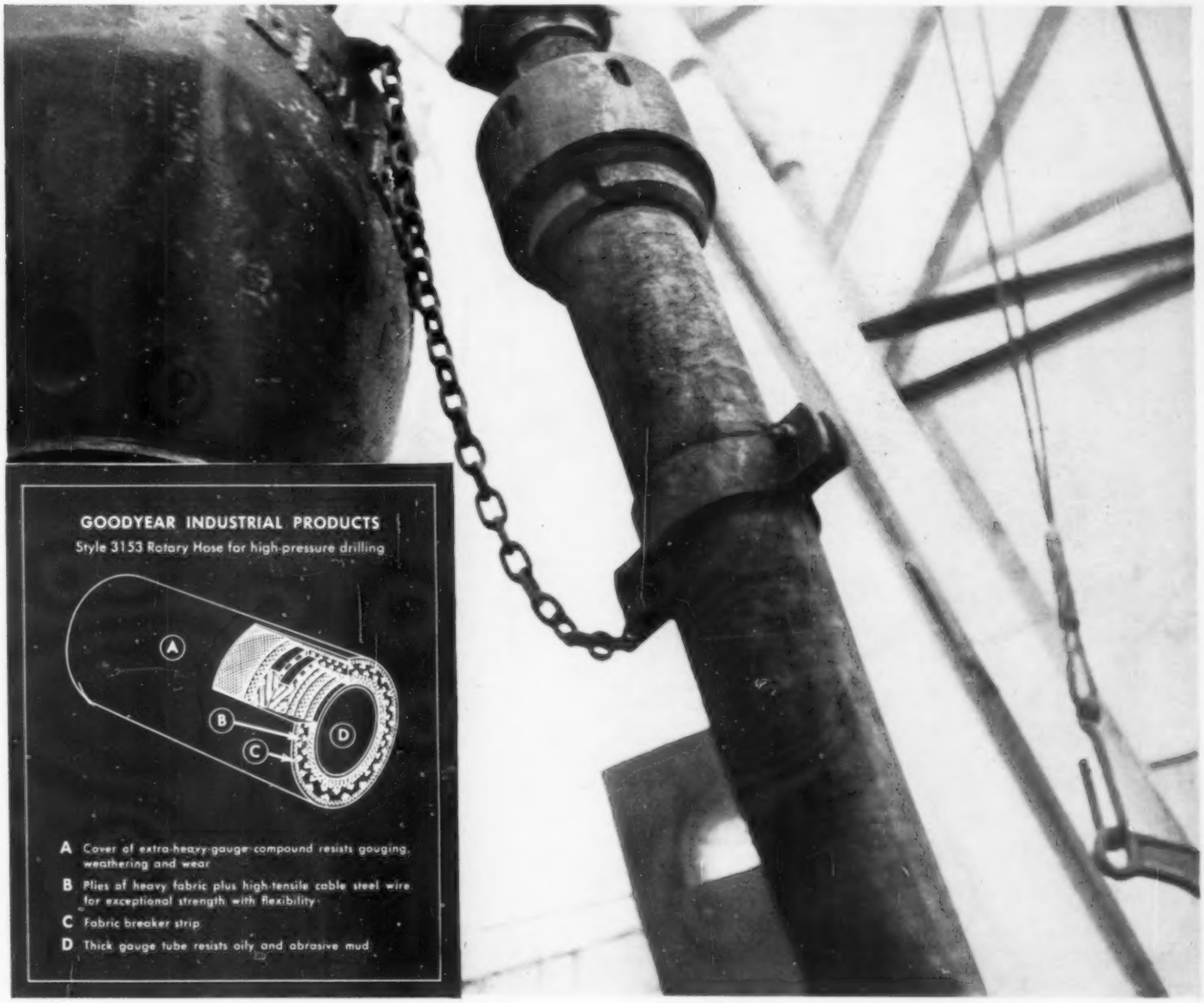
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GOODYEAR

Rathbone on Investment in the UK

"Today the economy of the United Kingdom has not only been stabilized but is showing all the traditional vigor, resourcefulness and inventiveness that has symbolized this great nation," said M. J. Rathbone, president of Standard Oil Co. (New Jersey), at the formal inauguration of Esso Petroleum's new 4½ million ton/year at Milford Haven in Pembrokeshire by the Duke of Edinburgh in November.

"As a single example of this encouraging progress," he went on, "perhaps I can recall that when the Fawley refinery was built, about 66% of the materials were British-made. In the case of Milford Haven, this figure has jumped to 99.5%. That seems to me about as pure as you can hope to get."

At dedication of Milford Haven refinery, Esso Petroleum's Chairman Hugh C. Tett explains to the Duke of Edinburgh the working of a cigarette lighter, disguised as an LPG storage tank, while Jersey Standard's President M. J. Rathbone looks on with amusement.

Recalling the Duke of Edinburgh's visit to the States and the recent British Exhibition in New York, Mr. Rathbone said: "On that occasion you reminded us of the close historic and economic ties between our two nations, and of the need for these links to be continuously strengthened to our mutual advantage. I hope, Sir, you may see in this refinery a tangible example of what happens when this philosophy is put into practical effect. It is a wonderful symbolization of the links between our two countries. Our investment in Milford Haven and our other large investments in the United Kingdom are, indeed, an expression of our confidence in your country. I can assure you it is only a small token of the investment we shall make in the United Kingdom in the future."

Hugh C. Tett, Esso Petroleum chairman, said this was not only Britian's newest refinery, but in many respects, the company thought, the most advanced technically. It was the first in the UK to be entirely air-cooled and the degree of automatic control was such that the whole of the £18 million refinery was at that moment being operated by control room staffs totalling no more than 16 men. Behind each one of them was an investment of over £50,000.

Thanking the principal contractors—Foster Wheeler, George Wimpey, John Mowlem, Whessoe, Wm. Neil & Son (St. Helens) and Motherwell Bridge & Engineering—for their work, Mr. Tett said the job was entrusted to Foster Wheeler as main contractor for three reasons: because of their great experience, because they came as tried friends from building the Fawley refinery, and there was a third reason—they made substantially the lowest bid. He referred, too, to the "unique engineering achievement" performed by John Mowlem & Co. in the difficult task of building the jetty and marine terminal.

J. E. C. Stephens

M. F. Somerville

"Total" Enters Gasoline Retailing

Total Oil Products (Great Britian) Ltd, subsidiary of Cie. Française des Pétroles, announced mid-November it expected to open its first stations in December for the retail sales of "Total" brands of gasolines, diesel road fuel and lubricants. These would be in the London and Manchester areas. Previously the company had for several years confined its sales to the commercial consumer market.

C. G. C. Redman

Announcing this "important decision" in the expansion of CFP activities, C. G. C. Redman, director and general manager, said the world-wide growth of the "Total" was such that entry into the UK market was "certain and logical. We intend to introduce Total products on their own merit and on the merit of the dealers who will handle them. Our policy envisages steady expansion under conditions of fair trading. We have no wish to enter into any price-cutting war. It is hoped to attract the motorist not only by the quality of the products but also by better forecourt service and the investment of millions of new francs is envisaged." The gasolines sold have octane ratings (research method) of 101, 97, and 84 respectively.

F. L. Duriau, development manager, said sales would be at the same prices as those of the established major distributors, and the majority of agreements with retailers would be of the usual kind. There would be no restrictive clauses in regard to other companies' lubricants. From surveys made it was expected some 20% of current "tied garage" gasoline sales agreements were due to end during 1961, and Total felt it could reasonably hope to be operating at between 50 and 150 stations during the year.

Among other Total executives are P. L. Burgin (director and legal adviser), J. E. C. Stephens (finance manager and secretary), M. F. Somerville (sales promotion manager) and W. A. Beattie (chief engineer).

F. L. Duriau

P. L. Burgin

Another New Gasoline Retailer

The established pattern of UK gasoline retailing may be further altered in minor degree by the entry of the Rank Organization, which has so many interests outside films and the cinema business generally. This group is building its first gasoline station in Worcester and is awaiting planning permission for several more in other parts of the country.

New Oil Investment Trust

Oil and Associated Investment Trust Ltd.—now a public company but originally registered as a private company September 1959 as Oil Securities Investments Ltd.—is offering nearly 4,000,000 ordinary 5s. shares for private subscription at par. The idea behind this offer is primarily that oil shares bought at their present levels will prove a very profitable investment in the long run.

Though the company has general investment powers, it is intended to invest the funds mainly in shares of companies in the oil industry in the UK, Commonwealth, Europe and America, and in other industries directly or indirectly engaged in the production and distribution of oil and gas and their derivatives. It is held that at present the gross dividend yields obtainable on leading oil shares are comparatively high and earnings cover for these dividends is substantial. Through purchase of shares in this trust investors, it is argued, can secure a wider spread of interests in the oil and allied interests than is normally possible. It is the board's intention to build up revenue progressively and to distribute each year as dividends a high proportion of the company's income. A London Stock Exchange quotation for the shares will be sought "when the time is considered appropriate."

Chairman of the company is Sir John Duncanson (director Commonwealth Bank of Scotland) and the directors are V. G. Baker (director, Tankship Finance (U.K.) Ltd.), D. F. E. Browne (chairman Seton Trust Ltd., who also have the management of the new trust), A. S. W. Joseph (managing director, Leopold Joseph & Sons), and A. F. A. Urquhart (London Stock Exchange).

British Group of AACE Formed

A British group of the American Association of Cost Engineers has been established in London under the chairmanship of J. H. Herbert, estimating engineer of Kellogg International Corp. The deputy-chairman is K. M. Curtwen, Allbright & Wilson Manufacturing Ltd., Birmingham. It has the same objective as the parent body, with respect to British conditions. The group is already able to provide members with a library and office services, and a series of regular lecture meetings started in December, when the treasurer, G. Kirby (Constructors John Brown Ltd.), opened a discussion on the organization of an engineering department from the estimating aspect.

Anyone interested in the new body should contact the secretary, T. B. Woods (Humphreys & Glasgow Ltd.), at 32 Spring Close, Sherborne St. John, Basingstoke, Hants.

BP's New "Ferrofining" Process

An improved process—"Ferrofining"—has been developed at British Petroleum's research center which enables lubricating oils to be produced without the conventional acid and clay treatment stages, thereby eliminating the problems of acid tar and spent clay disposal. The essential feature of the process is the use of a specially developed catalyst, and hydrotreating can be used as a finishing stage for both solvent-refined and straight distillate lubricants.

The first Ferrofining plant will be a 3,000 b/d unit at the Dunkirk refinery of BP's French associate and units at other BP refineries are under consideration. Ferrofined lubes are reported to show excellent oxidation resistance and to give the same performance as those produced by conventional methods. Their suitability for specialty products has also been confirmed.

(Continued on page 10)

A superior thru-tubing jet perforator featuring:

ENCLOSED FIRING SYSTEM

MINIMUM DEBRIS

DEEP, CARROT-FREE PENETRATION

HIGH WELL FLOW INDEX

ALL NEW McCULLOUGH *mac-jet*

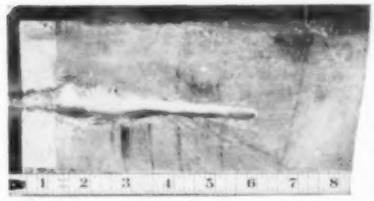
The McCullough Mac-Jet is an all-new development in expendable jet perforating – designed to provide maximum perforating efficiency – to obtain highest production from thru-tubing and slim hole completions.

- Enclosed Firing System – Each Mac-Jet unit is self-contained, including jet charge and integrated firing system, enclosed in a frangible, high strength case. This design eliminates the use of exposed primacord. Units are securely locked together and may be fired from bottom up or from top down.
- Minimum Debris – Entire Mac-Jet Perforator breaks up into small bits when fired. Mac-Jet units, spacers and bottom firing assembly are all disintegrating to assure complete break-up.
- Superior Perforation Characteristics – "big gun" performance – penetration equal to or better than that of many larger jet casing guns. Carrot-free perforations, large deep holes, high well flow index.
- Size, Shot Density, Length – $1\frac{11}{16}$" OD and $2\frac{1}{16}$" OD Standard shot density is four per foot, 90° phasing.

Disintegrating spacers are supplied to provide fewer shots per foot when required. Any number of Mac-Jet units may be run in any length desired.

SPECIFICATIONS:

	$1\frac{11}{16}$" OD	$2\frac{1}{16}$" OD
Pressure, Temperature Rating	15,000 psi. @ 300°	13,500 psi. @ 300°
Maximum Temperature	350°	350°
Total Charge Weight	12 grams	20 grams
Av. Penetration (Berea Sandstone)	5.69"	7.45"
Av. Entrance Hole	$\frac{13}{32}$"	$\frac{7}{16}$"
Av. Well Flow Index	1.1+	1.44
Fill-up – 1' Gun, $5\frac{1}{2}$" Casing	1"	–
Fill-up – 1' Gun, 7" Casing	$\frac{1}{2}$"	1"



Standard Berea Sandstone target perforated by $1\frac{11}{16}$" OD Mac-Jet. Average penetration, 5.69"; average entrance hole size, $\frac{13}{32}$; average well flow index, 1.1+

DISINTEGRATING SPACER – Available in various lengths to provide fewer than four shots per foot. Disintegrates into small bits when perforator is fired.

McCullough *TOOL COMPANY*

LOS ANGELES • HOUSTON • EDMONTON • *CABLE ADDRESS: MACTOOL*

London Letter

(Continued from page 8)

Hydrogen Sulfide Removal Process

Worldwide patents have been applied for jointly by the North Western Gas Board and Clayton Aniline Co. for a new process—the "Stretford"—for removing hydrogen sulfide and recovering pure sulfur from coal gas, petroleum gases and other gases. The process uses as an absorbent certain compounds produced in the manufacture of anthraquinone dyes from coal tar and plant experience has shown the cost of purifying coal gas to vary between O.1d and O.2d per therm according to the market price obtained for the recovered sulfur. The process is claimed to have far-reaching industrial application, especially in connection with the petroleum industry, both in oilfield and refinery use. Neither company concerned intends to design or erect plants for this process. Instead, they have nominated the following as licensees: W. C. Holmes & Co., Newton Chambers, R. & J. Dempster, Simon-Carves, Humphreys & Glasgow, and Woodall-Duckham.

New rayon-reinforced butyl rubber-lined flexible tank for transport road of 2,000 gal of ICI iso-octanol.

British Equipment News

"Portolite" flexible tanks lined inside with rayon reinforced butyl rubber and made by *Marston Excelsior Ltd.* are now being used by ICI's Heavy Organic Chemicals Division to transport 2,000-gal loads (over seven tons) of its carbonylation alcohols over long distances by road. Filled on a flat-bottomed lorry, these containers need no built-up sides, and are returned rolled when empty, taking up only about three feet of the lorry deck.

Elliott Brothers (London) Ltd. has taken over a large additional space at its Boreham Woods works and is installing machine tools and equipment to implement its recent agreement with Leybold's of Cologne, considered the world's largest group of high-vacuum engineers.

A new company, *Leybold-Elliott Ltd.* has been formed with an initial issued capital of £100,000, and with Elliott holding the majority interest, to promote the industrial vacuum process equipment of both parent groups throughout the British Commonwealth (except Canada). The company has also taken over Leybold's UK service organization, and the new Boreham Woods plant will make all Leybold vacuum equipment for which drawings exist.

Hayward Tyler & Co., member of the Stone-Platt group, has recently received orders for a large number of large pumps and steam turbines from Shell Tankers and from BP Tanker Co.

Petbow, Ltd., England, and Pye Industries Ltd., Australia, have formed a joint £500,000 Australian company which will gradually extend its operations to cover the entire Petbow range of engine-driven power plant and also the manufacture of Magnicon alternators under license from the Macfarlane Engineering Co., Scotland.

Oil Search in the UK

BP Exploration Co. has continued its search for indigenous oil, and produced 41,300 tons in the first half of last year against 39,840 tons in the same period of 1959. The main producing fields remain Duke's Wood, Kelham Hills, Bothamsall and Egmanton in Nottinghamshire, and Plungar in Leicestershire. Flooding operations have been started at the older Egmanton field.

Development drilling of the new Bothamsall (Notts.) field and at Gainsborough and Corringham (Lincs) is well advanced. In Bothamsall 13 successful wells had been completed by September, with production from horizons at about 3,200 ft. Five wells had also been completed at Gainsborough and Corringham, with production from around 4,500 ft. Oil has been found in several sands down to 5,300 ft in these fields.

Exploratory drilling continues in the Midlands and elsewhere. Tests of two wells completed at Apleyhead and South Leverton (Notts.) have shown encouraging oil indications, suggesting the possibility of yet two more small fields in this region. Three wells about 2,000 ft deep and a shallow hole have been completed at Kimmeridge (Dorset) but sufficient information is still lacking to decide if this will prove a commercial field.

Nylon Plant for Czechoslovakia

Highpolymer & Petro-Chemical Engineering Co., London chemical process designers and consultants, has signed a contract valued at about £1 million for a nylon tire cord plant with Strojimports and Polytechna, of Czechoslovakia. The equipment will largely be made in the UK by Vickers-Armstrongs (Engineers) Ltd.

The Weights & Measures Bill

Important and very extensive new provisions to protect customers are contained in the government's Weights and Measures Bill, published in November. (a) Liquid fuel, lubricating oil and any mixture of such fuel and oil, and (b) lubricating grease may be sold only by quantity expressed in such manner as may be so specified; if prepacked, it must be sold only if the container is marked with an indication of quantity; while when carried in a road vehicle it must be accompanied by a document giving the weight of the vehicle and its load apart from the oil, while a statement of the quantity delivered has to be given to the buyer. Turpentine substitute, unless prepacked, shall be sold by retail only by capacity measurement; if prepacked, the container must be marked with the quantity by capacity measurements.

In general it can be said that the practices now normally carried out regularly by bulk oil distributors will become statutory obligations.

New Publication

"Polyvinyl Chloride in the Tropics"—The trial described in this 56-page illustrated report was part of a program arranged by the Joint Services and the British Plastics Federation at the Tropical Testing Establishment in Nigeria to determine the behavior of plastics under tropical conditions.

In this particular trial, 13 batches of plasticized and 4 batches of unplasticized sheets of various proprietary grades of polyvinyl chloride (PVC) and related materials, and specimens of PVC covered electric cable and high tension cables were exposed for about two years at a number of sites in Nigeria.

Reports on Plastics in the Tropics No. 12—Polyvinyl Chloride is published by the Government Stationery Office, price 6s. (by post 6s.6d.).

Fuel Oil Imports

It was argued by Viscount Hall in a recent House of Lords debate on the fuel and power industry that it was "surely nonsensical" to continue to permit the unrestricted inflow of fuel oil and possibly natural gas, at any time, but particularly when there are balance of trade difficulties and while there was an abundance of fuel which gives the UK as good results on its own doorsteps. The argument was put forward that there was little prospect of preventing the continued recession of the coal industry unless the government could be persuaded to limit imports of fuel and other heavy oils or restore the penny a gallon tax which existed from 1933 to 1947.

Replying for the government, Lord Mills, paymaster-general, said he was not questioning the right of the government to tax fuel oil to raise revenue. But it was suggested this should be done to protect coal consumption. It was true that in addition to producing fuel oil from crude the UK imported large quantities. It was also true that it exported considerable quantities and, on balance, UK exports, including bunkers, were in excess of imports. "In other words, we produce in this country more fuel oil than we consume. Where," he asked, "would be the sense in taxing fuel oil unless the taxation is needed as a means of increasing revenue?"

UK invisible earnings in oil, which include the net earnings of the British controlled oil companies and their shipping earnings, together with the exports of petroleum equipment to the oil industry abroad are normally, he said, more than enough to cover the cost to the balance of payments of the total UK imports of oil. He thought that was important. It put a different picture on the matter. In view of this situation, he thought it would be quite wrong to try to get the oil companies voluntarily to restrict their imports or to tax oil in order to stop it being consumed.

Appointments

L. W. G. PERKINS has been appointed managing director of Cleveland Petroleum Co. Ltd. to succeed S. Collier, who has retired. A. W. Woolridge has also retired, and **D. A. C. DEWDNEY** and **G. W. POWELL** have been made directors.

N. E. HITCHCOCK, group development chemist for Castrol, Ltd. for the last nine years, now also holds the appointment of laboratory manager of the group's main research establishment in succession to the late P. W. L. Gosling.

N. E. F. Hitchcock

H. I. S. Catherwood

H. I. S. CATHERWOOD has joined Sigmund Pumps Ltd. as sales director, succeeding H. P. Lord, who has been appointed managing director of International Boilers & Radiators, a sister company in the Bookers groups. Mr. Lord remains a director of Sigmund Pumps.

J. RONALD GETTY, director of Tidewater Oil Co. (England), has been appointed president and general manager of Veedol International, the new company formed to direct the operations of Tidewater Oil's European manufacturing and marketing subsidiaries other than the Danish-based subsidiary Dansk Veedol. He will also direct Tidewater's export operations in Europe, Africa and the Middle East.

J. M. PATTINSON, C.B.E., and **P. T. COX,** M.B.E., deputy chairman of British Petroleum and managing director of BP Exploration respectively, have been appointed directors of Apex (Trinidad) Oilfields.

DR. H. K. WHALLEY, formerly director in charge of development for Distillers Co., has been appointed head of a new division set up with responsibility for the company's overseas chemical interests. He is assisted by **P. L. BRAMWYCHE.**

USA Equipment Links

Whessoe Ltd., Darlington, and The Shand & Jurs Co., California, have concluded an extension to their 1948 agreement giving the former exclusive rights to manufacture S & J fittings in France and to sell them within the European Economic Community and the French Union. A French subsidiary of Whessoe is being formed to build a plant at Calais and manufacture is expected to start next summer.

Perkins Gas Turbines Ltd. is now marketing the latest USA built Solar gas turbine—the 1,250 h/p "Saturn," which has many industrial applications. Perkins has exclusive rights to make and sell all gas turbines produced by the Solar Aircraft Co., Calif., throughout Europe, Africa and the Commonwealth (excluding Canada), but is concentrating initially on the 50 hp "Mars" unit.

Practical experience speaks for Mercedes-Benz Diesel engines A classical example: nearly all hydrofoil boats in the world are equipped with Mercedes-Benz Diesel engines. These modern high-duty vessels need a propelling unit that combines unusually high horse-power with light weight and compact design. The Mercedes-Benz Diesel Type 820 Db has these characteristics – and one more too: the famous Mercedes-Benz quality. For this reason it is not only to be found in the engine-rooms of practically all hydrofoil boats, but also in those of vessels of the conventional type, in locomotives and railcars, in heavy-duty building machinery and electric power plants.

0168 MAe

MERCEDES-BENZ DIESEL

CANADIAN NOTES

A. G. Bailey

Bailey Urges Oil Policy

A national oil policy to encourage crude export and expanded use of Canadian crude in Canadian refineries was urged by A. G. Bailey, president of the Independent Canadian Petroleum Producers' Association.

Mr. Bailey, who is also president of Alberta Gas Trunk Line Co. and vice president and general manager of Bailey Selburn Oil & Gas Co., Calgary, spoke at a meeting of the Alberta Landmen's Association in November.

His address added to the flow of opinions on what and how a national oil policy should be formulated, including the question of an Alberta-to-Montreal pipeline. The for-or-against the Montreal pipeline has been discussed by representatives of both major and independent companies (See WORLD PETROLEUM, September and November, 1960, page 14).

Pointing out that other countries have a national oil policy of one kind or another, Mr. Bailey said:

"I think it is obvious that Canada, out of sheer self-protection, is going to have to follow suit and quickly. If we don't, Canada will become more and more the dumping ground for distress cargoes of crude oil and refined products and our domesstic production and exploration will be seriously curtailed."

He emphasized that the main object of his association is to urge the Federal Government to adopt a national oil policy and to implement the recommendations of the Borden Commission report.

Mr. Bailey did not urge the immediate construction of the Montreal pipeline:

"Perhaps at some later date, a pipeline to the Montreal market carrying Canadian crude might be necessary but this would be down the road a little ways."

". . . the number one policy of the Independent Producers' Association is to urge the government that it should implement the recommendations of the Borden Commission report as quickly as possible.

"In broad general terms, the Borden report suggested that the large integrated companies marketing in Canada should be given until the end of 1960 to secure markets for Canadian crude totalling 700,000 b/d. They were to accomplish this target, first: by using every possible barrel of Canadian crude in their Canadian refining facilities, and, secondly, they were expected to find export markets obviously in the Pacific Northwest and the Midwest States as well as the Chicago area for additional volumes of Canadian crude.

"Without a definite acceptance of these recommendations by the Government thus cracking the whip, I don't think it is fair to expect certain companies to try and accomplish this target while other companies sit back waiting for some prodding by the Government.

"Even without Government direction, there has been some attempt made to meet the Borden Report's recommendations. For instance, I am convinced that Imperial Oil has made a sincere and somewhat successful effort to find markets by the increased use of Canadian crude in their refineries and also by tradeouts or exchanges for Canadian crude that they have managed to negotiate. I think they should be given full credit for their efforts as they have certainly been the leader in this regard. Canadian Oils has been using 100% Canadian crude in their refineries even though by so doing they must have suffered insofar as profits are concerned. B-A (British American Oil Co.) has also done a fine job in trying to work out the marketing problem and must be commended. Most of the others certainly talked a good game before the Borden Commission sometime ago but their efforts appear to have stopped there.

"There is another factor that should be mentioned in discussing the problem of the Montreal market. This has been unduly complicated by the excess or unnecessary refining capacity in that area. Most of this refining capacity is tuned to a different grade of crude than what we produce here in Western Canada. If the last two refineries that were built in the Montreal area had been located in the general Toronto area, as was strongly suggested to them before they were built, both by industry and government, these two refineries could now be using either foreign crude via the seaway or Canadian crude via our existing pipeline facilities. Instead, they are processing their company-owned foreign crude and shipping the resultant refined products by the products' pipeline to Toronto thus displacing the products of Canadian crude in that area. It is interesting to note that the throughput of the Montreal-to-Toronto products' pipeline just about equals the capacity of these two refineries.

"My proposal for a national oil policy would be to require all of those companies sharing the Canadian market to be responsible on a pro-rata basis for the securing of markets for Canadian crude either by increased use of Canadian crude in their existing refining facilities or by trade-outs and exchanges. My suggested target would be 600,000 b/d by January 1, 1961; 650,000 b/d by March 31, 1961, and 700,000 b/d by June 30, 1961. This is slower than suggested by the Borden report but it does take time to work out these deals. However, a good deal of the ground work has already been done and positive direction by the Government would certainly speed things up.

"Further I would suggest that should this voluntary type of plan fail or fall short of the targets, then a quota system should be envoked. Such a quota system should be a direct relationship as between the Canadian crude used by a refiner plus markets which he can secure for Canadian crude as against the amount of oil he would be allowed by quota to import. Should this quota system not work or be unmanageable then pipeline facilities from Western Canada to Montreal, whether it be an expansion of the existing facilities or a new line, might be necessary.

"I would like to point out that the Canadian independent is proud of the part that he has played in developing our natural resources. We are not a distress industry looking for a government handout nor do we seek government intervention in our business any more than do the majors. We do think that the facts must be faced and Canada must take her proper place in the world oil picture. This can only be done by the implementation of a proper national oil policy which will assure the continuing growth of this young and economically important industry. We are confident that our Government will buy such a policy and create the proper atmosphere whereby we can continue to make our contribution to the national welfare. Even though our interests are not the same as the majors, we hope we can maintain our place in the industry with them under fair and reasonable competitive conditions."

Gilby "Prefab" Gas Plant

British American Oil has placed its first dry dessicant type gas processing plant onstream near Gilby in central Alberta. The largely automatic plant, adjacent to the B.A.-C.P.R.-Starrs wellsite at LSD 6-13-40-3W5, took little more than a month to assemble.

B-A President E. D. Loughney said it is one of 20 or more small, prefabricated plants which various companies will have to build in western Canada before the end of 1961 as new fields are brought into production to meet growing export demands.

Gas sales from western Canada, which will average around 1.2 billion cu ft/day in 1960, are expected to increase about 80% by the end of 1961, when all gas authorized for export begins to move, he said.

The B-A plant, designed to supply a maximum of 15 mmcf/d of gas at 850 psig and 80 F, has started delivery of sales gas to the Alberta Gas Trunk Line. Stabilized condensate recovery from capacity operation will be 210 b/d.

Properly called a dry dessicant short cycle gas dehydration and hydrocarbon recovery unit, the Gilby plant is basically a three-tower adsorption unit with a condensate stabilizer column and open regeneration circuit. It was manufactured by Black, Sivalls & Bryson. Shop fabrication made possible very rapid assembly of interconnecting sections in the field.

McMurray Tar Sands

Alberta Conservation Board has given a long hoist to the proposal for commercial production from McMurray bituminous sands on the Athabasca River at rate of 31,500 b/d. Report said bluntly that present tight market for oil from normal sources would be disrupted by intrusion of Athabasca oil. Opinion is that commercial development is at least 5 to 10 years away.

May End Cooperation with USA

Donald Gordon, president of Canadian National Railways, estimated USA investors control about half Canada's manufacturing and mining industries and three-fourths of its oil and gas activities. He warned Canadian businessmen that Canada may be heading toward a break in its traditional policy of business cooperation with the USA. A sore spot with Canadians, said Mr. Gordon, is that in recent years Americans have been tightening their grip on their controlled companies by re-investing the Canadian earnings, and without having to put in new capital investment.

High Borrowing Costs

Officials of Alberta Gas Trunk Line are looking with concern at sharp rise in bond interest rates and drop in government bond prices. Faced with need to raise $110 million within next few months to pay for new foothills system, now under construction, they may have to pay upwards of 6% coupon on bond issue.

Output Rise Forecast

Canadian crude-oil production is forecast to rise sharply to 585,000 b/d in both January and February 1961—5,000 b/d over same two months in 1960. December 1960 will be only 513,000 b/d, down 8% from year ago. Big seasonal gain is normal in winter. March and April usually turn downward again.

New Export Markets Open

December saw two new export markets opened—with Gulf nominated for 5,000 b/d of Canadian crude at Toledo, Ohio; and Socony Mobil at Trenton, Mich., for 6,750 b/d. Forecast is for continuation and possible increases. The northern USA states market is now about 77,000 b/d—but the West Coast remains low at 39,000 b/d.

Geophysical Activity Up

Best month for geophysical activity in at least four years was November 1960—with 50 crews at work—up seven from 43 in November 1959. This was first month in several years when crews at work exceeded the one-year-earlier figure. The trend has been steadily upward every month since the low point in April.

B.C. Rail Movement

Biggest current threat to Alberta oil markets is start of rail movement of British Columbia crude from Taylor to Vancouver on government-owned railroad. Official policy is to promote greater use of producibility in province, backing out Alberta supply. Producers expect 50¢ cut in well-head price as price of greatly increased volume beyond curent 3,000 b/d.

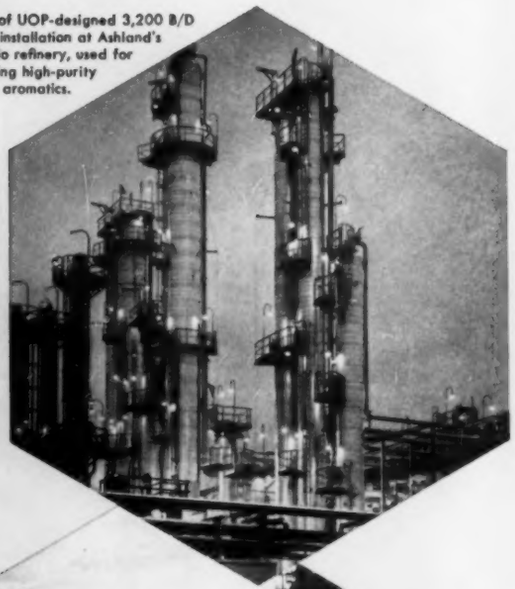
Market for Canadian Gas

Continental Oil's president McCollum has predicted demand for Canadian gas in the USA by 1965 will exceed 2.2 billion cubic feet per day.

CALTEX

Caltex ... serving the petroleum needs of more than 70 countries in Europe, Africa, Asia and Australasia

Udex® installation plays major role in Ashland's petrochemicals expansion program



View of UOP-designed 3,200 B/D Udex installation at Ashland's Buffalo refinery, used for producing high-purity aromatics.

UOP-designed units at Ashland's Canton, Ohio, refinery include Fluid Cat Cracking, gas concentration, Catalytic Polymerization, Visbreaking and vacuum distillation.

UOP processes contribute to Ashland's remarkable 36-year growth

By Robert E. Yancey,
Administrative Vice President
Ashland Oil & Refining Company
Ashland, Kentucky

R. E. Yancey

From a small 1,000 B/D skimming plant consisting of four shell stills in 1924, Ashland has grown to an operation utilizing six refineries with a total daily throughput in excess of 150,000 barrels of crude oil and an annual sales volume of $300,000,000.

Ashland serves the Ohio Valley and Great Lakes area through an efficient transportation network of crude oil lines, refined product lines, river towboats and barges, lake tankers, and trucks . . . Ashland branded products are sold through 3,500 service station outlets, and unbranded products through more than 1,000 independent distributors.

Udex, Hydeal®, and Naphthas Fractionating units provide expanded production of petrochemicals, jet and missile fuels

Our latest important expansion has taken place in the area of petrochemicals and other specialty products, such as aliphatic and aromatic solvents, special jet and missile fuels. Under this program a 3,200 B/D Udex unit for production of high-purity aromatics was placed on stream in May, 1958, at our Buffalo (N. Y.) refinery. Another UOP unit, now under construction at our Catlettsburg (Ky.) refinery will be the first commercial Hydeal process unit in operation for the production of benzene and naphthalene. Developed jointly by Ashland and Universal, this hydrodealkylation process will be used to produce benzene and naphthalene from low value heavy aromatics and alkylnaphthalenes. Benzene and naphthalene from the Udex and Hydeal units have numerous markets in the area of synthetic fibers, synthetic rubber, plastics, paints and other related fields.

Sales of petrochemicals and specialty products jump 44% in one year

Ashland's big push into the field of petrochemicals and specialty products proved extremely successful in 1959. Sales in these two areas jumped 44% in dollar volume over the previous year.

The importance of this new field of expansion was aptly phrased by Rexford S. Blazer, chairman of the board. "These sales . . . are highly profitable and demonstrate the value of the program of manufacturing diversification which the company will continue to expand. We place great emphasis on the production of tailor-made products for specialized uses throughout the great industrial area which can be served economically from our refineries and terminals."

Early facilities included Butane Isomerization and 'HF' Alkylation

Ashland's widespread activities are directed from the company's general headquarters located at Ashland, Kentucky, in the tri-state West Virginia-Ohio-Kentucky area. Catlettsburg, near Ashland, has been the site of Ashland's main refinery since the company's birth in 1924. The present corporation was formed in 1936 with the consolidation of Swiss Oil Corporation and Ashland Refining Company.

As sales increased, new units were added at Catlettsburg, many of UOP design. These included bubble tower fractionation (1925), an early single-coil Thermal Cracking unit (1926) later converted to two-coil, one of the first Catalytic Polymerization units for converting olefinic gases into high-octane gasoline, a combination crude atmospheric and vacuum distillation unit for the manufacture of asphalt and cylinder stocks (1938), a Butane Isomerization-'HF' Alkylation plant and catalytic cracking unit constructed during World War II for the production of aviation gasoline, and a 30,000 B/D fresh feed UOP Fluid Catalytic Cracking unit with gas concentration facilities added in 1956. Additional crude processing facilities were added in 1956 to increase the crude throughput to 80,000 B/D.

Company acquisitions add more process facilities and marketing outlets

Over the years, through the additions of various companies, Ashland now manufactures and markets a great variety of petroleum specialty products, many of which are sold in foreign markets. UOP processes and engineering services have been utilized extensively and to good advantage in all of our refineries. The Canton refinery, which has a crude capacity of 35,000 B/D utilizes many UOP-designed units, including Fluid Catalytic Cracking, gas concentration, Catalytic Polymerization, a Thermal Cracking unit later converted to Visbreaking, and a new vacuum distillation unit for the manufacture of asphalt.

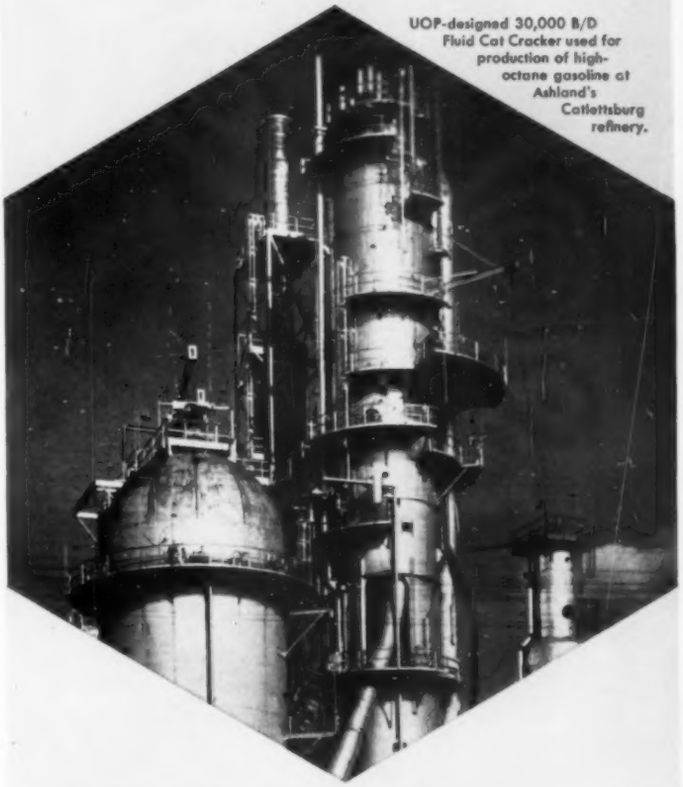
The Frontier refinery in Buffalo, N. Y., having a capacity of 32,000 B/D, is the site of Ashland's Udex installation which is an important cog in the company's petrochemical expansion program. A Hydeal unit is planned for this refinery. Additional UOP units at Frontier include Fluid Catalytic Cracking, gas concentration and polymerization. The addition of Frontier also provided Ashland with a number of valuable service station outlets and an extensive domestic fuel oil business. Asphalt is produced at Frontier as well as all of our refineries except the Valvoline plant, located at Freedom, Pa., which is primarily a lubricating oil refinery.

The purchase of R. J. Brown Company in 1956, and the Ohio-Indiana Division of Anderson-Prichard Oil Company in 1958, further strengthened Ashland's position as a refiner and marketer of industrial naphthas, solvents and petrochemicals. These two companies, along with the National Accounts Sales Department, market specialty products from our Udex and the new 8,400 B/D superfractionation units.

In November, 1959, Ashland obtained the modern refining facilities of the Louisville Refining Company, a large portion of whose processing installations were designed by UOP. Some of the more recent of these include facilities for the manufacture of asphalt, Fluid Catalytic Cracking, Unifining*, Platforming* and Merox*.

All of the six refineries now operated by Ashland have, at one time or another, installed units designed by UOP in cooperation with Ashland's engineering department. Practically all of our current expenditures are for facilities to make additional grades of profitable petroleum specialties, to upgrade the value of products from a barrel of crude oil, and to provide for more efficient and lower cost operations.

30,000 barrel-per-day Fluid Cat Cracker is a key process at Ashland's main refinery



UOP-designed 30,000 B/D Fluid Cat Cracker used for production of high-octane gasoline at Ashland's Catlettsburg refinery.

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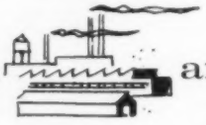
increasing its production,  and perfecting the

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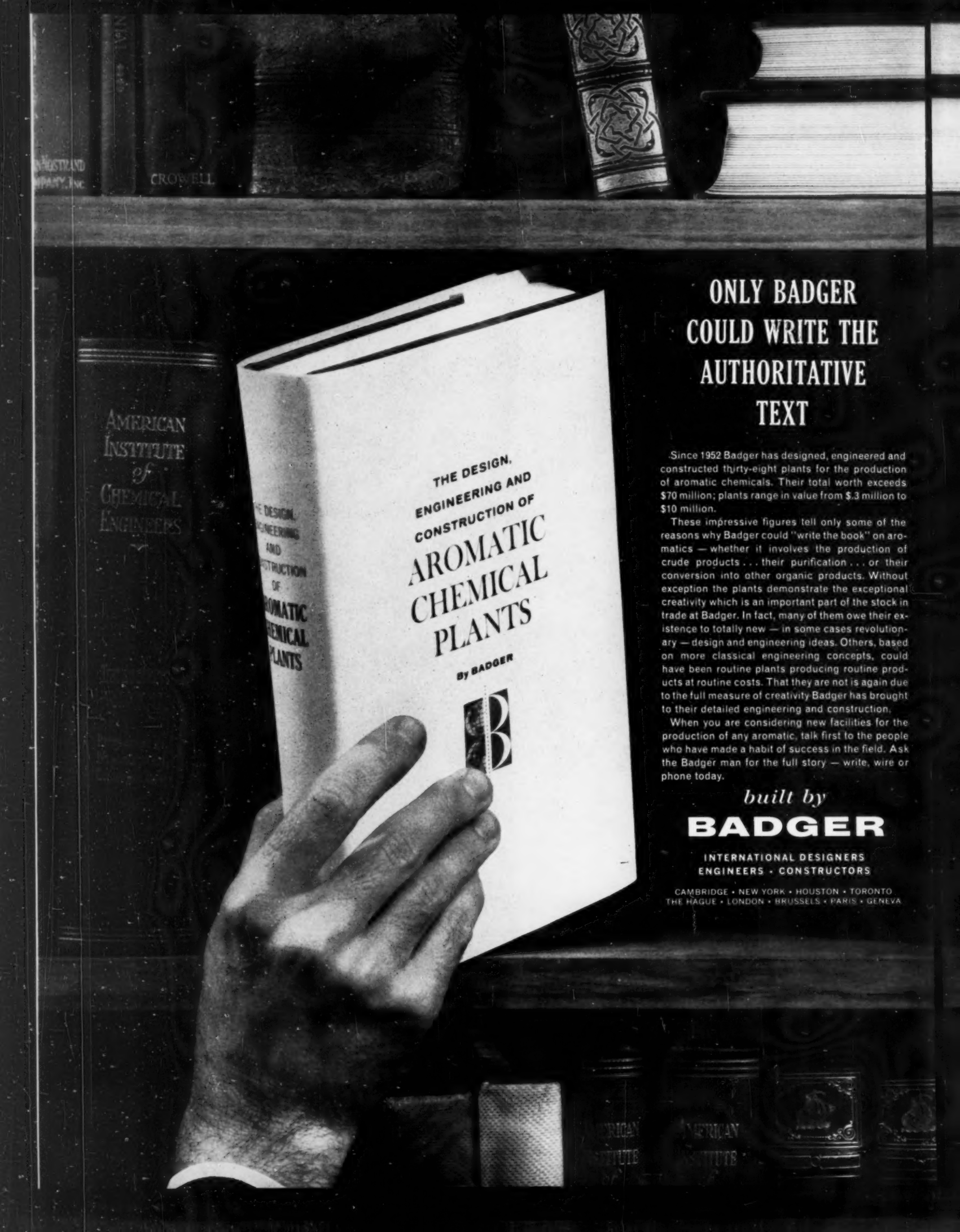

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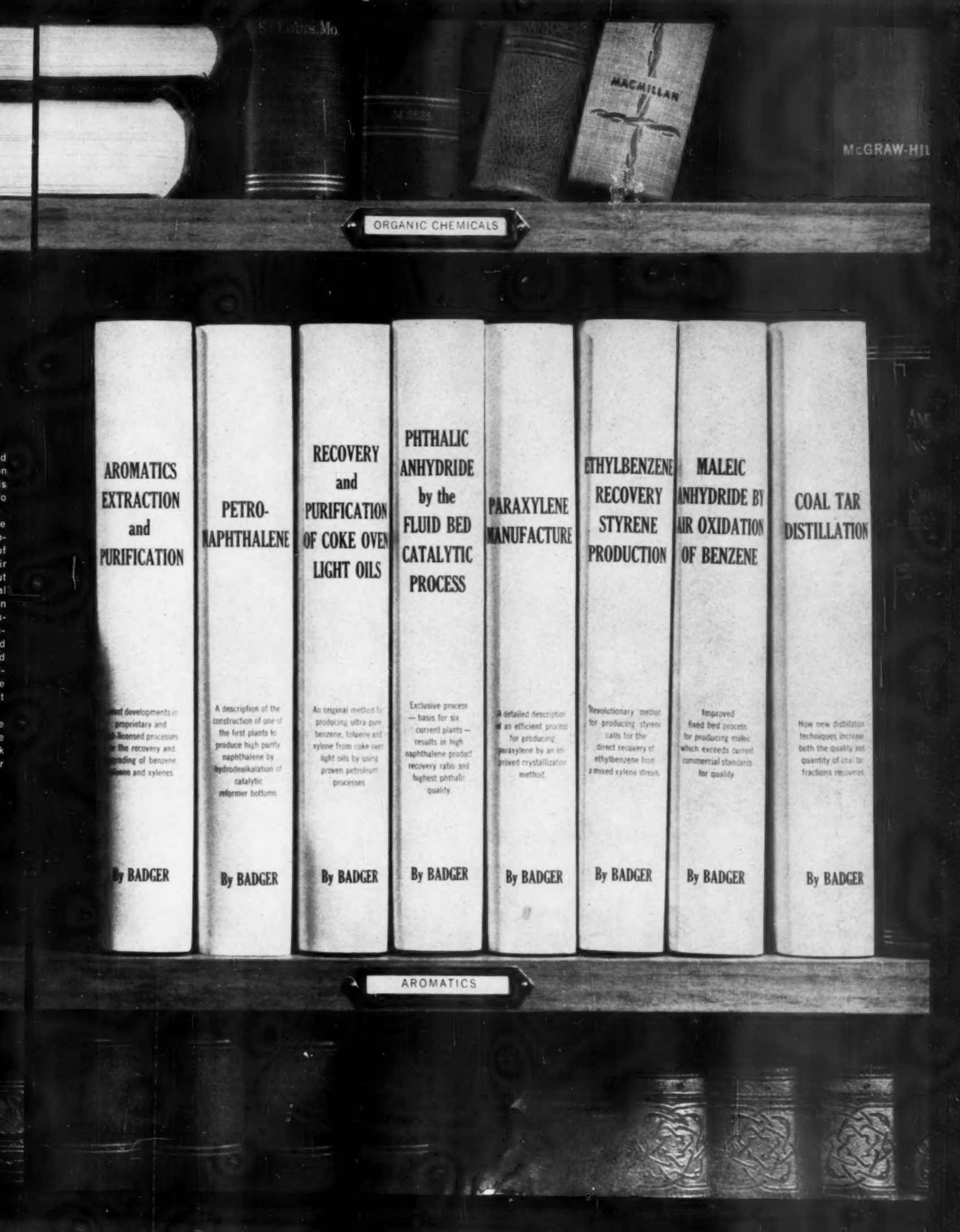
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How new distillation techniques increase both the quality and quantity of coal tar fractions recovered.
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AROMATICS

by William C. Uhl
Processing Editor

Highlights of the month—new hydrotreating process for lubricating oils; new process for extracting high purity isoamylenes from catalytically cracked gasoline; and shock tube technique provides assistance in fundamental research

The new hydrogen treating process for lubricating oils developed by the British Petroleum Group, and trade-named "Ferrofining," will provide a product yield of over 99% of very high quality treated oils at an operating cost less than conventional finishing processes, the company has reported.

It has resulted from research begun in 1954 in the BP research center at Sunbury-on-Thames, England, and at the laboratories of Soc. Francaise des Petroles BP, in Dunkirk, France. Pilot plant work has been going on since 1958 in an 8-b/sd unit at the BP refinery in Kent, England.

Although details of the process have not been disclosed, the company has stated that it uses a fixed catalyst bed and moderate temperatures and pressures. The three-component catalyst on an alumina base has a long service life. A charge has been in continual operation in the pilot unit for more than 13 months with no signs of reduction in activity. This catalyst permits the hydrotreating of not only solvent refined oils but also straight distillate lubes which normally are acid and clay treated. Development work on the catalyst has shown full activity can be restored by a simple burn-off with steam/air mixtures.

No hydrogen compressors are required because operation is at pressures below those of catalytic reforming. Average hydrogen consumption is 25 standard cubic feet per barrel of throughput. In addition, the operating temperatures are low enough so that very little desulfurization occurs, and very little hydrogen sulfide is produced. As a result, the reactor section can be constructed of an inexpensive carbon-½% molybdenum steel.

Costs have been estimated for a 3,100 b/d plant which will be erected in northern France, at the Dunkirk refinery of S.F.P. BP. The initial investment will be $495,000 (approximately $160 per bbl), not including local capital taxes. Such offsite facilities as power and steam generation, tankage and transfer facilities, cooling water, and the like are not included because they are available at the refinery. However, utilities costs were made a part of the estimated operating costs at levels which pay for associated offsite installations over the long term.

Operating costs for the 3,100-b/d unit have been estimated at 19.7¢ per barrel, including depreciation but not including interest, taxes, royalty, and overhead, and on the basis of 330 operating days per year. The BP Group points out that this compares favorably with conventional treating costs and is, in fact, little more than the cost of the activated clay used normally in clay treating. An additional advantage in the process—as in any hydrotreating of lubes—is the elimination of the problems and costs of disposing of acid tar and spent clay.

The BP Group has put the treated oils from Ferrofining through an extensive testing program, and is completely convinced of the high quality of the products. As a result, further units are now under consideration by BP in addition to the Dunkirk installation.

Availability of commercial quantities of highly pure isoamylenes could provide the industry with another good basic petrochemical. Use of isoamylenes as intermediates for synthetic natural rubber, new types of plastics, and many other new chemicals is increasing steadily.

Sinclair Research Laboratories, Inc. has developed a new sulfuric acid extraction process which yields isoamylenes of high purity (98.9 wt-% in the pilot plant). The process selectively removes isoamylenes from the C_5 fraction of gasoline from catalytic cracking. What it does essentially is to replace the close boiling C_5's admixed with the isomers by relatively high boiling hydrocarbons so that the final separation need be nothing more than an easy distillation.

The C_5 fraction of gasolines from catalytic cracking contain isoamylenes in concentrations ranging from 25 to 45%. Direct separation by distillation is difficult and therefore expensive. Sulfuric acid extraction followed by water dilution—the method used with isobutylene—could be used to recover the extracted olefins. However, the equilibrium distribution of isoamylenes between a hydrocarbon phase and a dilute sulfuric acid phase gives a much lower relative concentration in the acid phase than is the case at the same conditions with isobutylene.

This means that dilute sulfuric acid extraction of isoamylenes would require a higher acid-hydrocarbon ratio than does isobutylene. The reconcentration of diluted acid becomes a major problem if this approach is made to the recovery of isoamylenes.

Sinclair's process employs a new concept in the recovery of the tertiary olefins from the "fat" acid. The very equilibrium distribution which requires high acid ratios for extraction also makes it feasible to reverse the extraction. After acid extraction has taken place, the acid phase is contacted with a relatively high boiling hydrocarbon solvent to extract the isoamylenes from the acid. Then, simple distillation serves to separate the isoamylenes from the solvent. This method eliminates the need for dilution and subsequent reconcentration of the acid. Efficient removal of isoamylenes from the feed, and recovery from the acid, are attained by proper choices of phase ratios, temperatures, and the number of stages in each step.

The solvent used must have a boiling range high enough above the isoamylenes to make final distillation fairly simple, must be inert to the acid, and must give favorable equilibrium relationships for the distribution of isoamylenes between the phases. Paraffin solvents of 6 to 10 carbon numbers have been found most satisfactory.

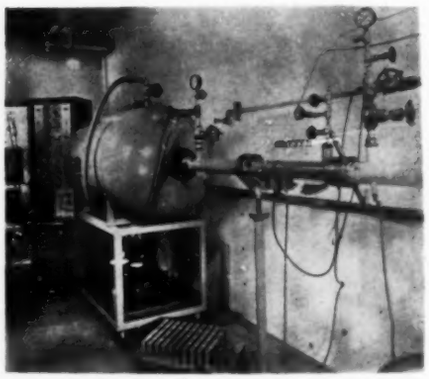
Both the acid extraction and hydrocarbon extraction stages are carried out in commercially available contactor vessels and settling vessels. Reaction rates can be closely controlled by regulation of the mixing rates and heat transfer rates. In the regeneration of the isoamylenes from the acid extract, the acid concentration is maintained close to that which gives the minimum corrosion rate on carbon steel. Also, the mixtures of hydrocarbon and acid are never exposed to temperatures above 100 F.

This new Sinclair process is now being offered for licensing by Stratford Engineering Corp., at whose laboratories the final semi-plant studies were carried out in steel equipment made by Stratford to confirm the commercial feasibility of the process and the equipment.

New knowledge on the fundamental nature of chemical reactions and more particularly some light on the many unanswered questions concerning very rapid reactions of gases at high temperature and pressure—these are the targets and hopes of Shell Development Co. chemists in Emeryville, Calif., who have been using a shock tube technique in the laboratory.

The problem, as Shell sees it, is that physical processes—mixing, heating and cooling—tend to obscure the true results of a chemical reaction taking place in the usual apparatus in the laboratory.

The shock tube technique overcomes many of these difficulties. In it, a shock wave traveling at speeds up to 7,000 mph is used to heat molecules in its path to thousands of degrees in millionths of a second. After a predetermined interval, the gas molecules are cooled equally rapidly.



Shell Development Co.'s shock tube in its special room at Emeryville, Calif.

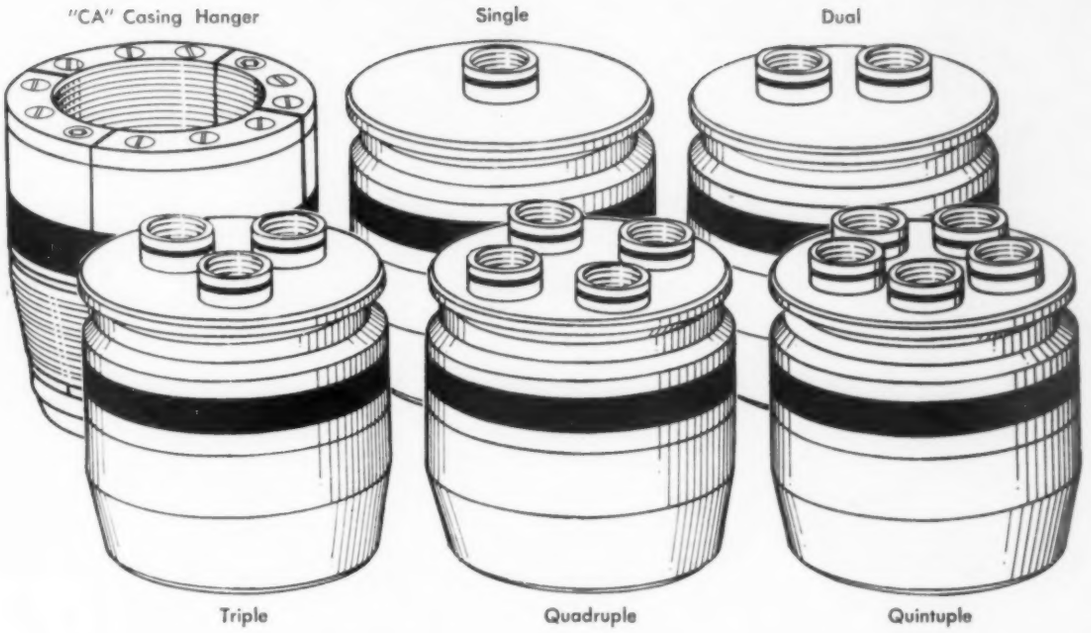
What this accomplishes is this. In normal laboratory equipment, for example, when a gas A reacts with another gas B, a small amount of gas C and a large amount of gas D may be formed. In fact, the amount of C may be so minute that the chemist concludes he has obtained D only as the result of the reaction. Actually what may have happened is that in the relatively long time required to heat gases A and B to, say 5,000 C, and then cool them, a large amount of D is formed even though C may be the major product at 5,000 C. The only way to find out is to cut the heating and cooling interval to as close to zero as possible.

The shock tube itself is an 18-ft. length of 6-in. steel pipe, divided into two sections. One end is connected to a steel vacuum chamber 3 ft. in diameter while the other end is closed. An aluminum disc separates the vacuum chamber from the short—or high pressure—section of the tube. The high pressure section is filled with a light, inert gas, preferably helium. Another aluminum disc separates this section from the longer reaction section of the tube, which contains the gases under study.

To start the reaction, the disc separating the high pressure chamber from the reaction chamber is ruptured by an electric discharge. This causes a shock wave to travel through the gases in the reaction chamber, raising gas molecules in its path thousands of degrees in millionths of a second.

A second discharge, electronically triggered at a

(*Continued on page 22*)



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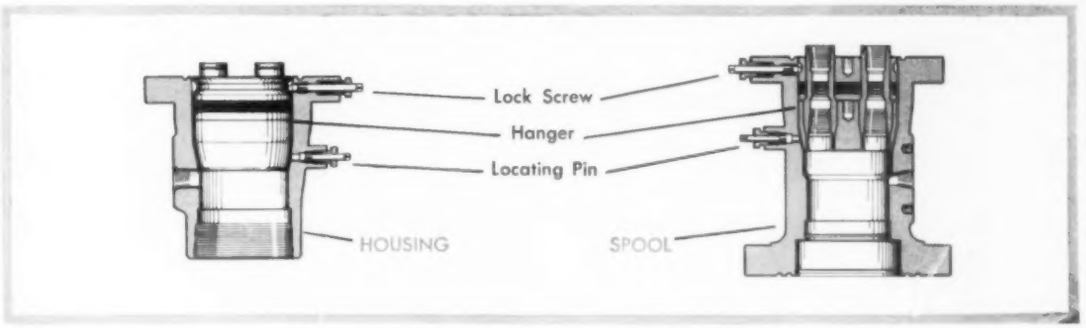

predetermined time by the first one, breaks the disc at the vacuum chamber. The light gas is evacuated, and the gas under study is cooled very rapidly and left in the reaction chamber for later analysis.

The design and fabrication of the metal discs was a major problem. Rupture must occur exactly the same way every time, at the right time.

Each disc has a circle divided into six equal parts embossed on it. The depth of the embossing determines when the disc will rupture. When a disc bursts, it leaves a crown-like shape with six triangular points on it perpendicular to the disc surface. Shell engineers spent considerable time determining the exact depths and patterns needed, and in designing and building a piece of equipment that will produce these discs quickly and accurately.

What's New in Processing Plants

Standard Vacuum Oil Co. and Shell Vietnam have made applications to the Vietnam government to build a 22,000 b/d refinery, at a cost of about $15 million.

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Mobil Oil has started construction of a 20,000 b/d delayed coking unit at Beaumont, Texas, with completion expected early in 1961.

• • •

Standard Vacuum Oil proposes construction of a $9 million lubricants plant at Bombay, India, to be on a 50-50 basis with the government, or another Indian investor. The unit would produce about 2,000 b/d of lube oils from feed from Stanvac's Bombay refinery.

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Shell Oil is considering expansion of its 40,000 b/d refinery at La Spezia, Italy.

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Gulf Oil Corp. has awarded a contract to Bechtel Corp. for erection of a 13,000 b/d lube oil facility at its Port Arthur, Texas, refinery. Installation is to be built as twin units, each of 6,500 b/d capacity, thus providing wide flexibility to handle some 12 different feedstreams from various existing operations.

• • •

Shell Oil and Caltex Oil are both ready to develop refining operations in southern Africa. Shell has advised Rhodesia that it's ready to submit a refinery proposal, and Caltex has completed studies for a $37 million, 30,000 b/d refinery proposed for the Union of South Africa.

• • •

ENI, the Italian state oil company, has signed an agreement with Ghana to build a 24,000 b/d initial capacity, $20 million refinery near Tema, Ghana, with possible eventual capacity of 40,000 b/d. ENI has already obtained firm commitments on two other plants in Africa—an $18 million, 25,000 b/d refinery in Morocco and a 20,000 b/d plant in Tunisia—and has made a bid for a refinery in Sudan.

• • •

British Petroleum will build Northern Ireland's first refinery. To be at Belfast, it will be a 30,000 b/d plant, with an initial investment of about $22.4 million, and is to be completed some time in 1963. Negotiations are now under way with Belfast Harbor Commissioners for a site on reclaimed land near an existing oil storage facility on Musgrave Channel.

• • •

Regent Refining (Canada) Ltd. will complete early this year an expansion in crude capacity at Port Credit, Ont., to 28,000 b/d from the current 20,000 b/d. A $2 million petrochemical plant being built there is scheduled for completion by next summer.

• • •

An agreement in principle has been reached between the Nigerian government and Shell-BP Petroleum Development Co. for the latter to construct a $33.6 million, 20,000 b/d refinery at Port Harcourt, for completion by 1963-64. Shell Petroleum Refining Co. of Nigeria Ltd., a new affiliate, will build and operate the refinery.

• • •

Shell Refining Co. (Philippines) Inc. has given Bechtel International the contract for its 25,000 b/d, $20 million refinery to be completed in 1962 at Tabangao, Batangas Bay, Luzon, Philippine Islands.

• • •

Hydrocarbon Research, Inc., has contracted with Commentry-Oissel Cie, of France, to supply engineering services in the erection and operation of a new refinery in Thailand, outside Bangkok, with a capacity of 5,000 b/d. The Thai government is building the plant, which will cost more than $19 million. Standard Oil Co. (Indiana) meanwhile has abandoned its efforts to establish a plant in Thailand, but is continuing negotiations to purchase a plant in Italy.

• • •

Tidewater Oil Co. expects to complete a 20,000 b/d $20 million Isocracking unit at Avon, Calif., in the second half of 1962, under license from California Research Corp. The plant will include a 50 mmcf/d hydrogen generating plant.

• • •

Representatives of National Bulk Carriers Inc. and American Independent Oil Co., two USA firms, have been negotiating with Rhodesian government for a possible 15,000 to 20,000 b/d refinery.

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SN Repal and Cie. de Raffinage en Afrique du Nord will build a small refinery adjacent the Hassi Messaoud field, with completion by June, 1961.

• • •

Northern Natural Gas Co. has started construction of a $9 million propane extraction plant at Bushton, Kans., with completion scheduled for August. The plant will be able to process 900 mmcf/d of natural gas, extracting—in addition to the propane—butane, isobutane, ethane, and some natural gasoline.

• • •

Bulgaria has begun construction of a 20,000 b/d refinery at the Black Sea port of Burgas. It is being built with a $32.5 million credit from the USSR, who will supply also technical assistance and the crude oil. Completion is scheduled for 1963.

• • •

Esso Standard Italiana has applied for approval to build a 60,000 to 80,000 b/d refinery (including a 12,500 b/d catalytic reformer) at Pavia, near Milan. Another Jersey Standard affiliate, Stanic, has obtained government approval to double capacity of its 45,000 b/d refinery at Bari, and now indications are that Jersey may soon exercise its long-held option to buy into RASIOM, an independent Italian refiner with a 100,000 b/d plant in Sicily, possibly a controlling interest.

• • •

Kyushu Oil is a new Japanese firm reportedly launched by a group headed by Yawata Steel Co., with plans for completing a new refinery on Kyushu Island by 1962.

• • •

Soc. Francaise des Petroles BP is boosting the capacity of its Dunkirk, France, refinery to 52,000 b/d of mixed Middle East and Saharan crude, by adapting unused existing equipment to raise capacity by 11,000 b/d; completion is expected by mid-1961.

At the Lavera refinery, near Marseilles, the company is installing plant and storage to produce up to 100,000 ton/yr of bitumen, with completion scheduled for first half of 1962.

• • •

The Porto Marghera refinery, near Venice, Italy, owned jointly by BP and AGIP, is building a 4,000 b/d catalytic reforming unit, with completion expected by mid-1961.

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Italian government has approved proposal for two refineries at Porto Torres, Sardinia, each of 2,400 b/d capacity. The companies involved, Soc. Algherese Industrie Chimiche Agricole (SAICA), and Sarda Industrie Resine SpA (SIR), also propose building associated petrochemical facilities.

What's New in Petrochemicals Plants

Reichhold Beckacite, French affiliate of Reichhold Chemicals, Inc., will build a 10.5 million lb/yr maleic anhydride plant at Niort, France.

• • •

Asahi Chemical Industry Co. expects to complete in May, 1961, its $4 million, 15 ton/day acrylonitrile plant at Kawasaki, Japan.

• • •

Bayer, Hoechst, BASF, and Friedrich Uhde have joined forces to provide the engineering, processes, and technical knowledge to set up a $25 million, petrochemical plant in India to produce naphthalene and B-T-X aromatics. They will each receive shares in a corporation established by the Indian government to operate the plant.

• • •

Montecatini and Royal Dutch/Shell have formed a subsidiary, N.V. Rotterdamse Polyolefinen Mij, to build and operate a polypropylene plant in Rotterdam, Netherlands.

Polymer Corp., the Canadian government-owned synthetic rubber and chemical company, plans two plants in Europe—one in France to make special rubbers and one in the United Kingdom to make butyl rubber. Program cost is estimated at $40 million, and will involve both British and French capital, take two to three years for completion.

• • •

Canadian Oil Cos. Ltd. will install a $750,000 Hydeal unit for converting toluene to benzene at its Sarnia, Ont., refinery, to double the company's benzene production to 7 million gal/yr. Completion is planned for June, 1961. Hydeal is the catalytic hydrodealkylation process developed by Ashland Oil & Refining Co. and licensed through Universal Oil Products Co.

• • •

Texaco Inc. plans a 30-million gal/yr benzene unit, one of the world's largest, at its Port Arthur, Tex., refinery. The new facilities, to include a Unifiner-catalytic reformer, a Udex extraction unit, and related facilities, will go onstream in the second quarter of 1962.

• • •

Soc. Belge de l'Azote et des Produits Chimiques du Marly, of Liege, Belgium, will build a 25,000 to 30,000 ton/yr styrene plant at Lillebonne, France, for Ethyl-Synthese, using a process from Koppers Co. Inc.

• • •

Esso A.G. is planning a $12 million petrochemical expansion at its Cologne, Germany, refinery, which will double the refinery yield of material used as a petrochem plant feed, from 7 to 14% of total refinery output. Existing units at Cologne can produce (ton/yr): ethylene, 45,000; propylene, 35,000; butadiene, 7,500.

• • •

Negotiations are underway between Paz Oil Co. and the Israeli government for the installation of polyethylene and carbon black manufacturing facilities at the Haifa refinery.

• • •

Solar Nitrogen Chemicals has awarded Arthur G. McKee & Co. the construction contract for a $2- to $3-million urea unit at its new Joplin, Mo., plant, the first such unit in the USA to use a process licensed by Stamicarbon N.V., the Netherlands. Completion is planned for October 1961.

• • •

Esso affiliates in Sweden are building a steam cracking unit at Stenungsund, for completion in the spring or summer of 1963. Its output, for two new petrochemical plants, will be about 75,000 ton/yr of ethylene, plus propylene and butadiene.

One plant, a 15,000 ton/yr polyethylene unit, will be operated by a new firm owned jointly by Union Carbide and a Swedish concern, Fosfatbolaget. Another Swedish company, Mo och Domsjo, is building an ethylene oxide plant with an initial capacity of 10,000 ton/yr; it will produce ethylene glycol from the oxide.

• • •

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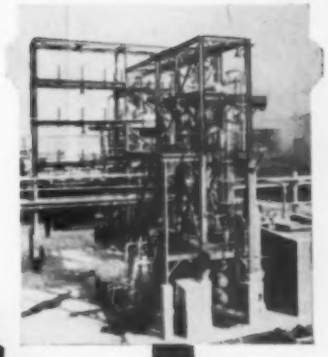

Esso's Fawley Refinery. An Esso photograph

Shell's Stanlow Refinery. A Shell photograph

The British Petroleum Limited's Refinery, British Petroleum photograph

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– M. J. Rathbone, President

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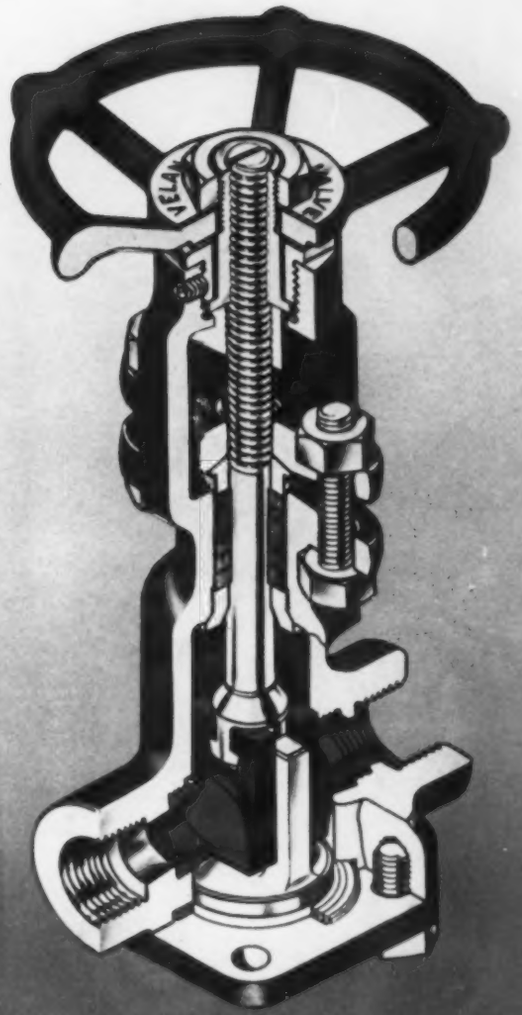

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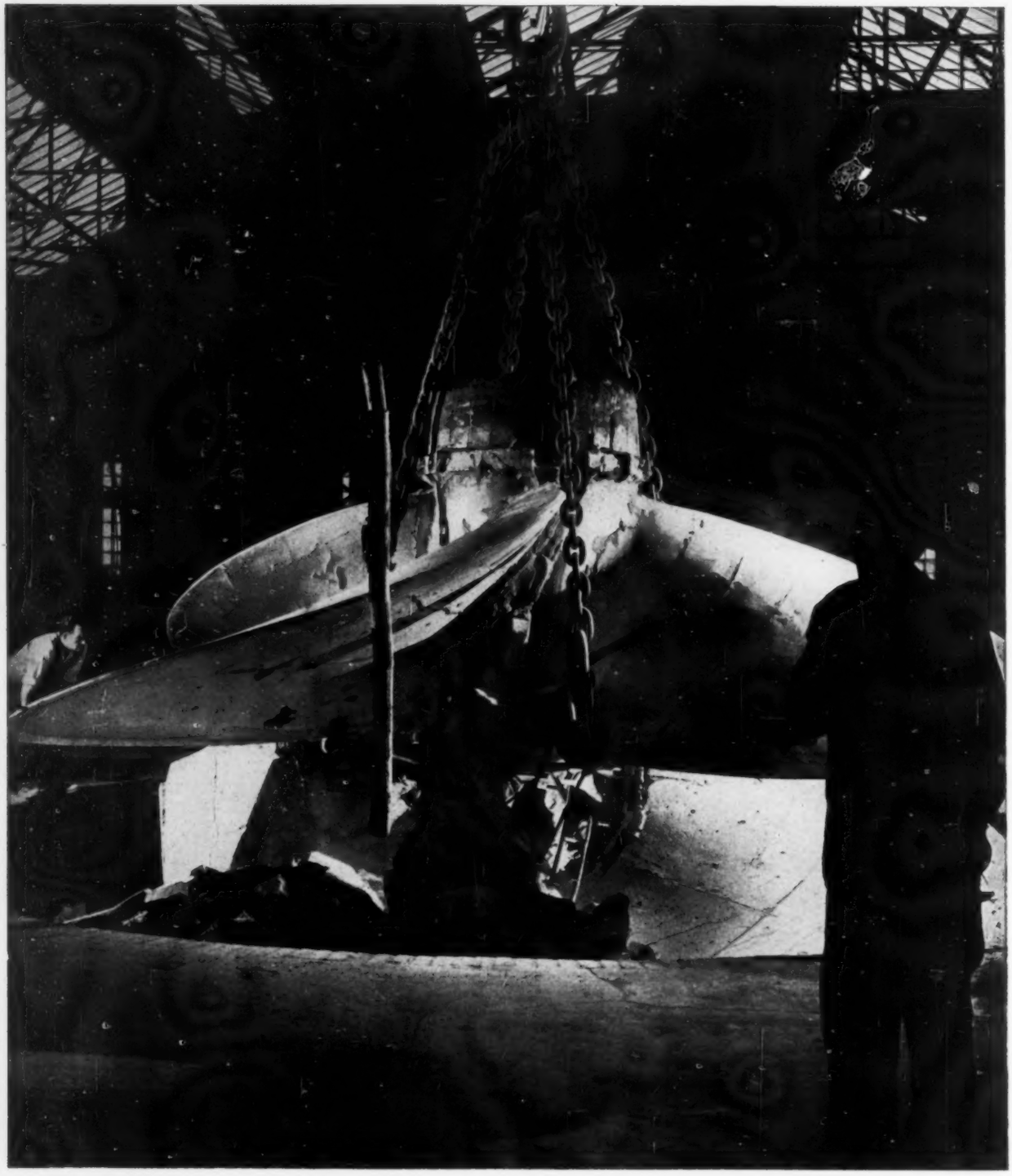

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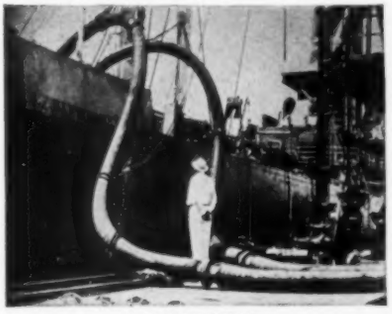

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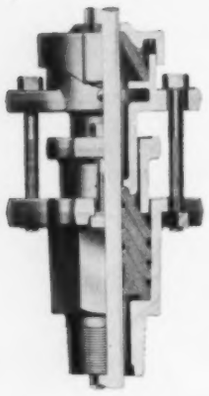

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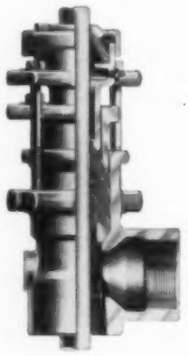
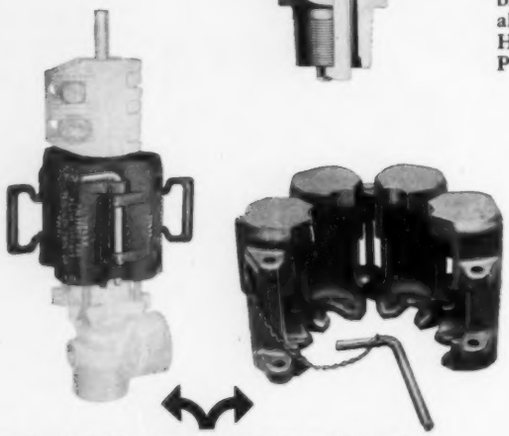
A combination Tee and Stuffing Box only 15" high. Eliminates one threaded connection between Stuffing Box and Tee. Full opening — allows rods to be run or pulled without removing Stuffing Box body. Has female thread to screw directly onto tubing.





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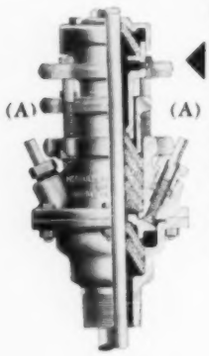

HERCULES TYPE DP (Double Packed)

Duplex Stuffing Box for use on high pressure or intermittently flowing wells. Allows Main (upper) Packing to be safely and easily replaced while well is under pressure. The two compression bolts (A) are turned clockwise until the lower Packing seals off. The Main Packing can then be removed and replaced.

HERCULES OIL RESERVOIR GLAND

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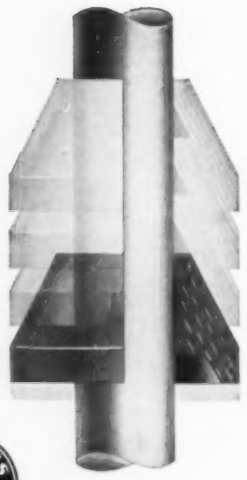
Each set of Hercules Cone-Shaped Packing Rings now include the NEW, SOLID Split Bottom Cone Packing Ring. This new solid ring provides greater contact with the polished rod and a more substantial base for the upper Packing Rings, resulting in *longer* packing life and superior performance. A complete set now consists of three *regular* and one new split *Bottom Cone* Ring.



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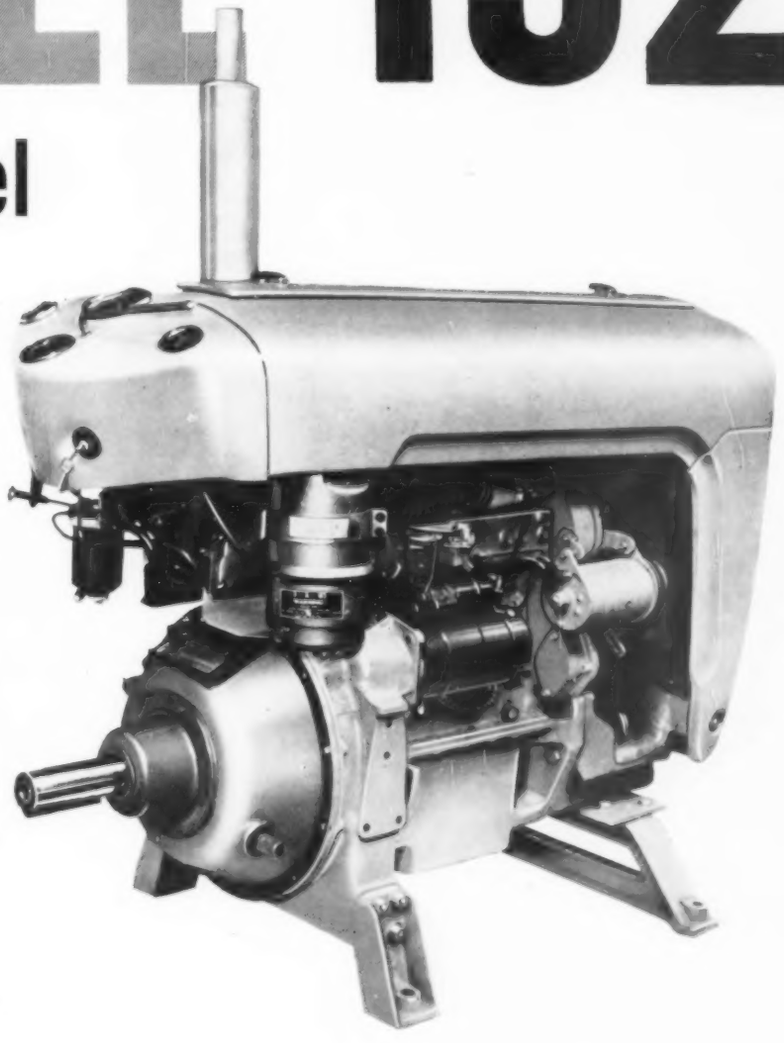

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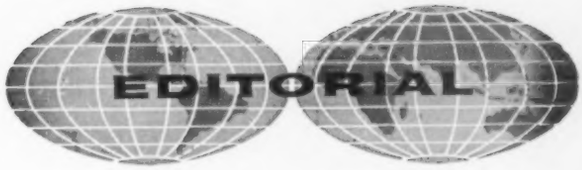


HOW MUCH IS TOO MUCH?

Signature of the offshore concession agreement in Kuwait has given the time-honored concept of 50-50 a boost in the Middle East and strengthened the concept elsewhere. Shell Group, who received the prized concession area from Kuwait, succeeded in the face of determined opposition—some of which offered far more to the government than 50% of profits. The grant to Shell, then, must be taken as a reaffirmation of the Ruler of Kuwait's belief in the 50-50 principle. As such it is an important event, since the Ruler is the most respected government leader in the Middle East today.

Historically, the concept of 50-50 is too well known to need repetition. From its institution in Venezuela during the early 1940's, it spread to the Middle East in 1950 and has since remained as a basic principle of government-company relations. It represented a victory for those members of oil company management who desired a long-term, mutually satisfactory relationship with their host governments instead of bickering and gradual yielding on one side or the other.

There are drawbacks to having such a simplified relationship, of course. 50-50 has become the norm, even for unexplored areas with little known oil prospects and not very great potential. It was never designed to apply to such areas, but has become very widespread.

There is no magic formula by which 50-50 was derived. Like Topsy it just grew. There seem good reasons for concluding that it is not far wrong, however. Venezuela threw out the president of Creole Petroleum Corp., in effect, when he made a bitter denunciation of the overall tax hike to about 60% of company profits. It is interesting to look back on that speech by Mr. Haight and compare it with actual results.

He predicted a slowdown and almost complete halt in oil exploration in Venezuela. That has occurred. There are no seismic parties active and only about 34 wells drilling, less than a third the total of one year ago. The government has been forced to institute a modified form of exchange control over the once-firm Bolivar. Oil exports are finding it increasingly difficult to maintain their place in the face of competition from the Middle East and Russian crude exports of crude and products. Other aspects all bear out Mr. Haight's predictions.

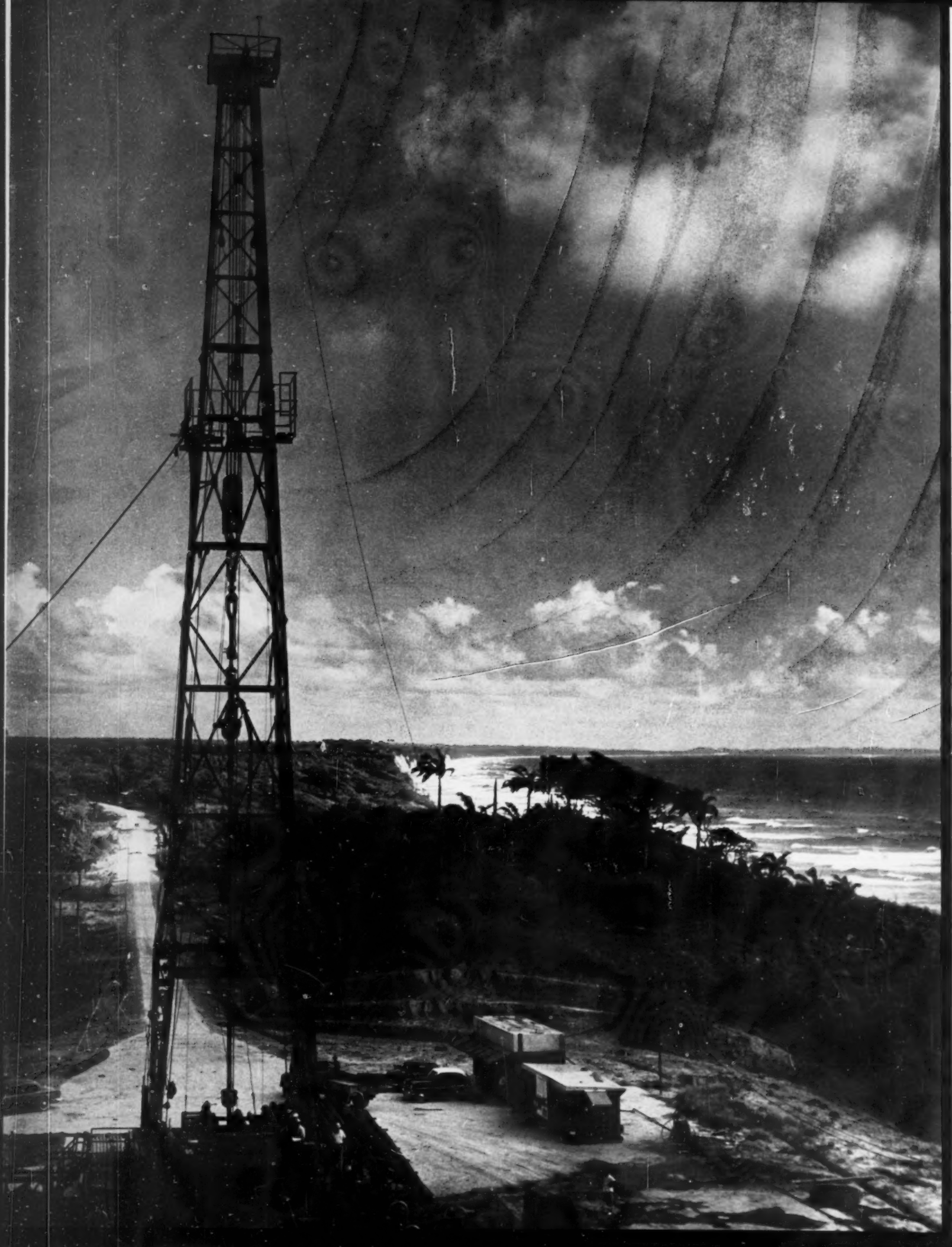
In view of this, is the 50-50 concept wrong or right? Again, the situation is too complex to generalize, but in the case of Venezuela, abandoning the concept certainly was damaging to the industry and to the country.

Still another element has come into play now on the international scene. Russian competition, long dismissed as not an important factor, has begun to show its teeth. At the recent conference in Beirut, the Arab nations were treated to the spectacle of the Russian aims revealed. From its present two percent of world markets the Russians wish to raise their exports of petroleum to about 14%, and maybe higher in some years. Other than the export of gold, they have little other means of raising their export earnings to purchase equipment from abroad that is desperately needed, and the lengths to which Russian competition is prepared to go is quite clearly revealed in the recent agreements with Italy. Based on a price of $1 per barrel, about 25% of Italy's requirements will be supplied by the Russians over the next four years.

Can the oil companies meet this competition, already defined by one leader of the industry as the prime motive behind the recent cuts in crude oil prices in the Middle East? The oil industry has been beset by similar crises before and survived. They must adjust, however, or they will fail. The recent dissolution of Standard Vacuum is an example of what must be done. That company was dissolved primarily because the parents, Standard Oil (New Jersey) and Socony Mobil, needed the direct lines of responsibility and flexibility that only complete control and direct ownership can supply to fight a Far East oil battle against the Soviets.

In this time, with the Russian bear at the door, the oil companies need the support of their host governments if they are to keep their place international markets. This is a time for moderation in government demands on the companies. The companies cannot fight on two fronts—forcing the Russian threat back and increasing their payments to governments at the same time.

There is a mutual interest in increasing sales of petroleum and in firm prices, an interest which is shared by company and government alike. Discussions are inevitable even within the same family. But a united front in the face of a common threat is fundamental and necessary.



International oil — its ills and cures

by Augustus C. Long

A distinguished leader in the international petroleum industry sees a rough road ahead—but would have it no other way. World prorationing is an admirable aim, but one very difficult to achieve

IN WEIGHING AND ASSESSING the many factors which have contributed to the industrial development of this country over the past 50 years, it is immediately evident that petroleum has played a role of overriding significance. The rise of the United States to its present position of industrial dominance has occurred in almost perfect parallel with the corresponding growth and refinement of the petroleum industry. In fact, it may be stated that this industry has provided not only much of the impetus, but also much of the direction, of our over-all industrial progress during this past half-century.

Despite an understandable tendency on the part of some to refer to the oil industry as being "miraculous," this record of achievement was not easily accomplished. Over the years we have experienced both crude oil surpluses and crude oil shortages. We have had periods of overproduction, collapsing prices, and near-chaotic conditions during which it sometimes appeared that the entire industry was racing toward economic destruction.

An illustration of this is the industry's record of operations during and following World War I. In the closing period of the war the country was faced with a serious oil shortage, and for several years thereafter there was widespread fear that the United States was running out of oil. However, new fields were discovered, and by the mid-1920's the pendulum was swinging the other way. This situation was climaxed in 1931, when the great East Texas field swamped the country in a sea of oil, and crude was selling for as low as ten cents a barrel.

This breakdown of the crude oil market combined with the great economic Depression to ruin hundreds of companies. Yet, despite this experience, the petroleum industry survived and came back again to weather many other storms. These have included World War II, the Korean War and the Suez crisis, followed by the oil lift to Europe. During all this time the petroleum industry has been harassed by the Justice Department, investigated by Congress, and sniped at by uncounted government boards and bureaus. Yet it has emerged from every difficulty in sound condition and with its record even brighter than before.

Today we still have plenty of problems to solve. Two American companies—including a Texaco subsidiary—have been expropriated in Cuba for refusing to refine Russian crude. The tide of nationalism is imposing heavy demands on all our international companies in many parts of the world. We are in a period of over-production and soft prices. Percentage depletion is under attack, and gasoline taxes are rising. We are hobbled by discriminatory import controls, and now the coal industry is attempting to force upon the country end-use controls which would deprive the customer of his free choice among fuels. Rising costs are threatening to reduce the rate of return on investments. If the industry is to continue making the necessary investments for growth, and to provide expanding job opportunities, and to give the consumer ample petroleum supplies at reasonable cost, we shall need greater discipline all around, among the petroleum companies themselves, and also on the part of governments, labor, competing fuel industries, and consuming countries.

Nevertheless, just as we have solved our problems before, we will solve these. None of them is insurmountable.

One reason for looking to the future with confidence is the fundamental nature of petroleum itself. Our industry today performs a more vital function in our economy than at any time in history. This is reflected in the vast and growing consumption of petroleum products throughout the Free World.

Free world demand now stands at 18.8 million barrels per day—almost four times the level of 1938. In the last five years this demand has risen by 4.4 million barrels per day, and in the next five years it is expected to increase another 5.6 million barrels per day. By then—1965—the petroleum requirements of the free foreign world will exceed those of the United States.

We hear a great deal about nuclear, solar and other non-conventional forms of energy, but these will have little effect on the accelerating use of petroleum for at least 20

◄ *On Galeota Point, at the southwestern tip of Trinidad, heavy bush has been cleared and leveled to permit drilling. Texaco photograph.*

Augustus Long is considered a "hard man" in the oil business, but under his guidance Texaco has established one of the best dividend records going. His career did not begin in oil but in the navy where, after graduation from the United States Naval Academy, he served until 1930 and again during World War II. Since joining Texaco in 1930 he has served as director of eastern hemisphere operations, was named a director in 1950, and thereafter rose successively to become executive vice president and president. In 1956 he was named to his present position as chairman and chief executive officer of Texaco Inc.

years. Nuclear energy will remain a negligible factor at least until the 1970's, and probably longer. Even if nuclear technology were further advanced, the abundance of low-cost petroleum would continue to make nuclear power a high-cost form of energy. Insofar as solar energy is concerned, it appears to be in the same category.

However, despite the petroleum industry's present position of strength, we cannot brush off the problems facing us. Let us look at one of the most significant of these —the impact of Soviet oil on world markets.

This is not a new problem. As in the case of over-production and soft prices, we have had Soviet oil competition before.

In the mid-1920's Russia began exporting oil to pay for machinery and heavy equipment abroad, and by 1932 these exports amounted to approximately 120,000 barrels daily. After that, Russia needed all her own oil for domestic use, and exports declined to about 21,000 barrels daily by 1938.

In the years following World War II and up until about 1953 Soviet exports were negligible, but then Russia once again stepped up her shipments of crude and products, and by 1959 these averaged more than 300,000 barrels per day. This figure will probably rise to about 400,000 barrels for the year 1960, or a little more than two per cent of daily free world demand.

What is the explanation for this trend? It is evident that Russia is accelerating her oil exports for political reasons as well as because of a desire to expand foreign trade. This is why she undertook to supply Cuba with some 60,000 to 70,000 barrels of crude oil daily, and India with approximately 6,000 barrels of products daily—in each case at substantial discounts.

It can therefore be assumed that Russia is using her oil in an effort to weaken the political and economic ties of the free world nations. In fact, it appears that her capacity to do this is not as great as has sometimes been suggested, even though the Communist bloc has announced a crude oil production goal of 5,200,000 barrels daily by 1965.

The reasons why Russia may well be overrated in terms of her ability to upset the world petroleum market are apparent in the figures available to us. The oil consumption of the Communist bloc has been increasing at the very high rate of about 14 per cent annually since 1951. Thus we know that, although the Soviet Union and her satellites are investing heavily in the development of natural gas, their petroleum consumption must continue to grow rapidly if living standards are to improve. It follows that if the Communist countries are to increase their oil exports much beyond the current two per cent of free world demand, they must either raise their petroleum production goal far higher than is presently indicated or curtail the growth of their living standards.

Another significant factor is Communist China, which is heavily dependent on Russia for petroleum supplies. It is estimated that Soviet petroleum shipments to China are currently running at a rate of approximately 60,000 to 70,000 barrels daily, and that China will probably continue to require Russian crude oil and refined products for another five years, if not more. It follows, of course, that every barrel of crude oil or oil products going to China is one less barrel available to Russia for the purpose of dislocating the Free World market.

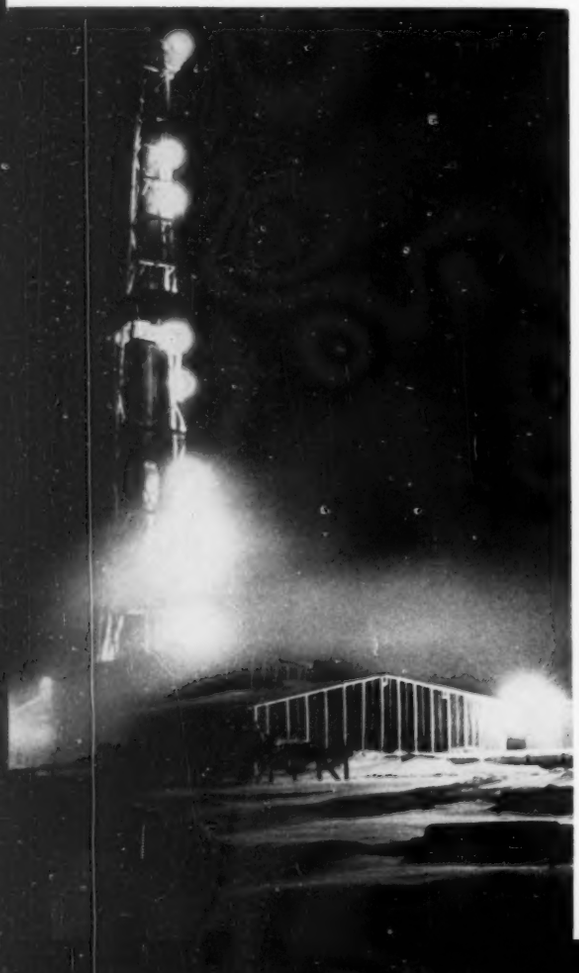
I do not deny that Russia represents a hazard to world marketing stability. Yet, despite competition from Soviet sources, I have every conviction that the American petroleum industry will continue to expand the volume of its operations in every area of the Free World.

Perhaps even more threatening to the health of the petroleum industry today is the world oversupply of crude. At the present time we find ourselves in a period of overproduction, weak prices, and low returns on investment. This situation has led some highly placed officials of several oil-producing countries to recommend the prorationing of crude on a world-wide basis.

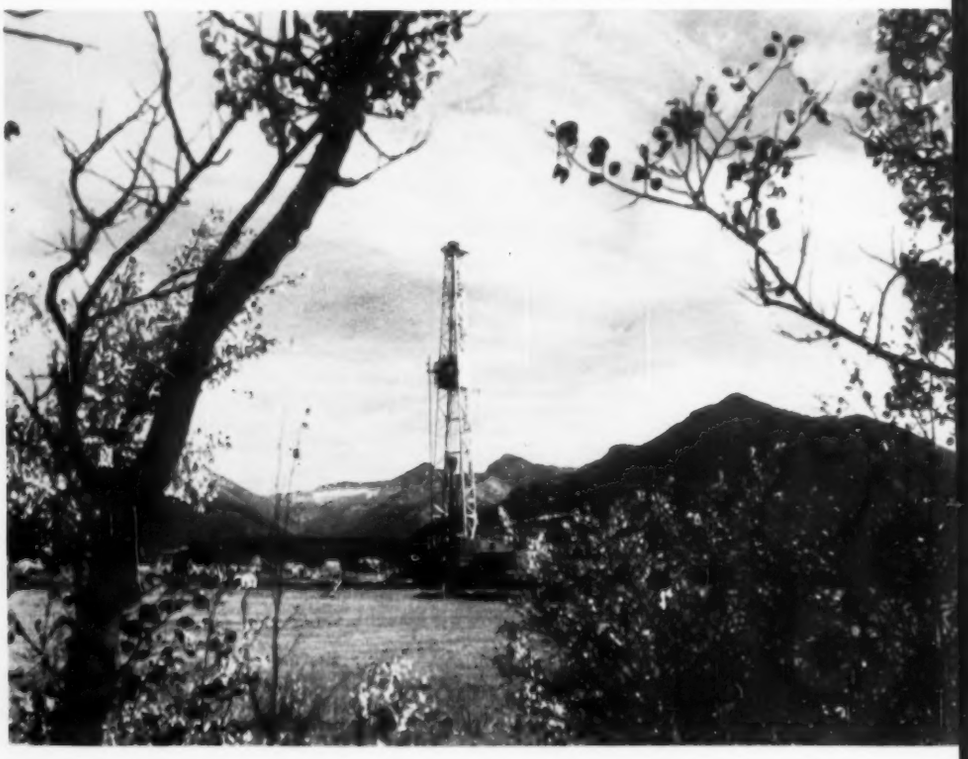
Texaco heartily endorses every sound and realistic measure for the conservation of crude oil and of every other irreplaceable natural resource. To achieve this end, our company cooperates to the fullest extent with every responsible body within the various states concerned with these matters.

Conservation in the production of crude oil in the United States is made possible by state conservation laws, the Connally Hot Oil Act, and the cooperation of the

Steam rises from mud pit blows across Nig Creek I, gas producing wildcat in northeastern British Columbia, where temperature often drops to 40 or 50 below zero during long winter



A Texaco Exploration Co. drilling rig in southern Alberta



The Texaco Trinidad Inc. refinery at Pointe-a-Pierre, Trinidad

producing states through the Interstate Oil Company Commission. These provide the framework within which the state regulatory commissions control production within the respective states. Because it accounts for nearly 40% of the crude oil production of the entire country, Texas alone—through the Texas Railroad Commission—has considerable influence on the balance between domestic supply and domestic demand.

The situation in the free foreign area is quite different. The largest single foreign producer is Venezuela, which in 1959 accounted for about 29% of total free foreign production. The four major Middle Eastern producers combined—Kuwait, Saudi Arabia, Iran and Iraq—accounted for 44%.

Furthermore, each of these five countries has substantial additional producing capacity. Consequently, no single one of them can, by its own efforts, have a substantial effect in adjusting total foreign supply to requirements.

There is an area of identity of interest among these countries, but it is a long and difficult road from proposing an international prorationing scheme to achieving the practical operation of such a scheme. There would be very difficult problems of allocating production levels, of admitting new producing nations into the organization, and of meeting the competition of other producing nations outside the organization.

It is not easy to work out problems as complex and technical as these through negotiations between sovereign countries, each with its own internal political and economic situation and with its own contractual agreements. It will be exceedingly difficult for these countries to negotiate and administer an international prorationing system which will allow efficient and flexible operations, and which at the same time will insure ample petroleum supplies at reasonable cost to the consuming countries which are the outlets for the oil.

Oil revenues are of crucial importance to the major petroleum exporting countries abroad. The oil industry has been able to make an enormous contribution to the welfare of these countries through the development and world-wide distribution of their petroleum resources in keeping with tested principles of competition and private enterprise.

We must be sure that any new policies will avoid undermining these basic principles.

As it is carried out in the United States today, Texaco regards prorationing as an enlightened conservation measure. If it were possible for any group of oil-producing nations to achieve the same results on the world scene, that too would be praiseworthy. Before such a proposal becomes practicable, however, it must be viewed not only in the light of reason, but of reality. It is my opinion that, admirable though this idea is, we must have further evidence that, first of all, it can be made to work, and that, second, it can be made to produce the results desired.

The issues of Soviet competition and world oversupply are but two of the many which the statesmen of the international petroleum industry must meet squarely and courageously. At the same time we should accustom ourselves to recognizing that these will not be the last problems to face the oil business, nor perhaps even the most difficult of those that lie ahead.

None of the members of the American petroleum fraternity was ever forced to join this industry. Every man who works for an oil company today enetered it of his own free will. And if by chance he did so under the misapprehension that life in the oil business was a quiet, easygoing affair, it was not long before he was jarred—and jarred roughly—to his senses.

It will never be an easy assignment to serve as one of the prime providers of energy to the world. No one is likely to find quiet and repose in an industry that has taken on itself the task of making the earth a better place to live for all men everywhere. There is no calling I know of that is more challenging or more demanding. And in all my experience in this industry, I have never met an oil man who would have it any other way. END

World crude production up 7.3% in 1960

Argentina and Algeria led the parade with large increases in crude output during 1960. The world gain was accompanied by a rise in Eastern Hemisphere relative importance and a further decline in the West.

DURING 1960 THE WORLD showed a very respectable increase of some 7.3% in crude production. The total went from 19,528,-010 b/d in 1959 to 20,954,736 b/d in 1960, based on preliminary production figures for 1960. The rate of increase in production seems to be slowing down somewhat, but is expected to show a good increase in 1961 as well. The rise in European demand helped the 1960 totals and is expected to continue through 1961.

The United States continued to decline relatively to the remainder of the world. From its position as producer of nearly 100% of the world's crude over 100 years ago, the position of the United States has declined until only slightly over one-third of the world's crude supplies now come from the original crude producer.

During 1960 both the Eastern and the Western Hemispheres increased, although the rate of increase was much higher in the Eastern, with about 16% over 1959 compared with 4% for the Western.

Soviet Russia leaped into second place in the world for the first time during 1960, displacing Venezuela from that time-honored position. Soviet production is expected to continue to increase rapidly, spurred by a 14% annual rise in demand.

Two widely-separated areas showed the greatest relative increases—Argentina and the Sahara. Argentina increased her crude production greatly, from 122,418 b/d in 1959 to about 160,274 b/d in 1960. The Sahara, as covered later, did even better. Venezuela continued to gain modestly, although the companies there are far from optimistic about their futures. Trinidad went along at a slow but always-up pace, with production rising every month in a regular procession to reach 125,000 b/d at the year's end. The government there is watching the situation with some concern, not wanting to increase production too fast fearing Trinidad will be saddled with most of the financial burden in supporting the new West Indian Federation.

Other countries of the Western Hemisphere pretty much held their own. Chile showed no ill effects from the earthquake, so far as her oil production rates are concerned. Ecuador and Bolivia went along at a steady pace, although the latter may pick up if Gulf's new finds prove lucrative enough to spend about half a billion dollars on a major pipeline out of the country.

Canada showed only a modest increase, and clamor arose that the industry had not complied with the Borden Commission's recommendations for a sharp production increase. The proposal of a pipeline to Montreal carrying major crude supplies there to a protected market took on new life almost immediately.

The Middle East, spurred on by Europe's demand increase, rose even higher, and all four large producers averaged over one million barrels daily during the last part of 1960, the first time they had all done so. Kuwait in particular is up, almost reaching the 2,000,000 barrels daily mark at the year's end. The Neutral Zone continued a steady rise, selling its heavy crude in a fuel-oil-consuming Eastern Hemisphere.

A second major area of increase was Africa, especially the Sahara. There, crude flow through the new pipelines rose to the surprising total of over 200,000 b/d by the year's end. The crude is flowing through a large pipeline recently built to the Mediterranean. The same general area, but across the border into Libya, will see crude start to flow during this year from Esso's find at Zelten where a 100-mile pipeline is under construction now. No appreciable amounts will flow before the year's end, however. A second large pipeline in the Sahara, that from the CREPS fields in lower Algeria (now the OCRS) to the Tunisian coast is complete but reportedly little crude is flowing through due to opposition by the Tunisians.

WORLD CRUDE OIL PRODUCTION
(Barrels Daily)

Country	1959 (Final)	1960 (Preliminary)
United States	7,054,000	7,017,000
Canada	506,049	522,466
Mexico	264,033	271,247
Total No. America	7,824,082	7,810,713
Argentina	122,418	160,274
Bolivia	8,685	8,900
Brazil	64,630	85,000
Chile	17,600	19,700
Colombia	142,500	145,000
Cuba	525	300
Ecuador	7,558	7,700
Peru	48,583	52,300
Trinidad	112,040	118,000
Venezuela	2,771,000	2,848,000
Total So. Amer. & Caribb.	3,295,539	3,445,174
Total West. Hemisphere	11,119,621	11,255,887
Austria	45,727	45,100
France	30,093	38,100
Germany (West)	99,664	107,400
Italy & Sicily	36,054	42,301
Netherlands	35,500	36,700
United Kingdom	1,700	1,700
Yugoslavia	11,400*	12,100*
Total West. Europe	260,138	283,401
Angola	953	1,205
Gabon	13,967	15,300
Morocco	1,934	2,000
Nigeria	11,223	17,350
Sahara (OCRS)	27,337	185,000
Total Africa	55,414	220,855
Albania (est.)	9,588	11,100
Bulgaria (est.)	4,900	5,000
Czechoslovakia (est.)	2,700	2,600
Germany (East) (est.)	90	90
Hungary (est.)	19,500	20,000
Poland (est.)	3,600	3,700
Romania (est.)	233,555	234,000
USSR (est.)	2,577,937	2,900,000
Total Communist Block (est.)	2,851,870	3,176,490
Bahrain	45,133	45,080
Egypt	58,780*	86,803
Iran	944,621	1,202,000
Iraq	849,327	1,040,000
Israel	2,500*	2,000
Kuwait	1,383,165	1,520,000
Neutral Zone	116,269	134,000
Qatar	173,586	181,000
Saudi Arabia	1,095,399	1,230,000
Turkey	7,241	6,800
Total Middle East	4,676,021	5,447,683
British Borneo	104,300	93,100
Burma	10,200	10,500*
China (Communist)	40,500*	45,000*
India	9,800	10,100
Indonesia	380,926	391,000
Japan	7,600	9,900
New Guinea	5,100	4,400
New Zealand	20	20
Pakistan	6,300	6,200
Siam (Thailand)	200	200
Total Asia & Australia	564,946	570,420
Total East. Hemisphere	8,408,389	9,698,849
World Total	19,528,010	20,954,736

*Estimated.

1960 demand 21,590,000 b/d

World demand for crude petroleum and hydrocarbon liquids rose 6.4%. The outlook for 1961 is for an increase of 5.8%, to 22,837,000 barrels daily

WORLD PETROLEUM consumption increased 6.4% in 1960, to 21,590,000 barrels per day average, according to preliminary estimates which include crude oil and other liquid hydrocarbons. The 1959 world total was 20,304,000 b/d.

The increase was slightly less than the 6.9% rise a year ago. Rates of growth continued to shift, with the eastern hemisphere demand curve still rising more steeply than that in the western hemisphere.

Demand in 1961 is expected to hold fairly close to the last rate of increase. A 5.8% increase, of 1,247,000 b/d, to 22,837,000 b/d is forecast. This compares with the increase of 1,286,000 b/d for 1960 over 1959. Estimates are shown for major areas and for the total world in Table 1, and have been based on a study of the views of economists concerned with world-wide oil activities. They are believed to be somewhat conservative.

The preliminary estimates for 1960 for a world total of 21,590,000 b/d are slightly below (—0.9%) the forecast for 1960 of 21,789,000 made a year ago.

Primary reason for this has been the drop in the anticipated market in the west. The indicated USA total for 1960 of 9,651,000 b/d was 1.7% below the 9,820,000 b/d predicted a year ago; and the western hemisphere total of 12,096,000 b/d was about 2% below the year-ago prediction of 12,398,000 b/d.

This slump will continue to be felt for some time to come. M. J. Rathbone, president of Standard Oil Co. (N. J.) and chairman of the American Petroleum Institute, in an address at the annual API meeting in November, predicted that USA demand for products would rise an average of only 2.5% per year for the next few years, and warned that a continuation of the current slack business conditions until the middle of the coming year could hold the 1961 gain to less than 1%.

Pointing out that the US oil industry seems to be following more closely the general cyclic actions of overall industry, he said the oil industry must change its approach from a producing concept to a marketing concept.

Reaching a forecast demand in excess of 10 billion daily barrels for the first time in history, the eastern hemisphere continues to gain more rapidly than the west. Its share of the total world consumption in 1961 will be about 44.5%, compared with 43.3% in 1960.

In the eastern hemisphere as a whole, it is estimated that demand will increase 8.9% compared with a rise of 2.8% in the western hemisphere.

In Western Europe the increase in 1961 is expected to be about 10%, the same percentage increase as that for the USSR and bloc countries. Predictions continue for healthy growth in certain consuming areas of the European market, although not quite as large as for last year over 1959. For example, the rise in 1961 in West Germany will be slightly more than 11%, in Italy it will be about 11%, in the United Kingdom 8.4%, and in France 7.5%.

In the far east, Japan's aggressive pursuit of industrial activity generally continues to help that nation retain its dominant position in the growth picture; demand in 1961 will show an estimated 12% gain over 1960.

The historical trends in apparent domestic demand for the five major refined products as gathered and reported annually by the U. S. Bureau of Mines are shown in Table 2 for the years 1958 and 1959. Major products include only the following: motor and aviation gasolines, kerosine and jet fuel, distillate fuel oil, residual fuel oil, and all lubricants including grease. The totals do not include other refined products and refinery fuel and loss except for the USA in 1959, where the figure shown does include refinery fuel loss with residual fuel and other.

Beginning with its 1959 summary of world petroleum statistics, however, the Bureau of Mines provided an expanded coverage that now does include the other refined products as well as refinery fuel and loss.

As calculated on this new basis (but not indicated in Table 2), the Bureau reported the world demand total (excluding the Soviet bloc) in 1959 at 6,223 million barrels (17.05 million barrels daily). This was approximately 7% greater than demand in 1958. Domestic demand in the USA had increased 4%, in Western Europe 10%, and in the South Asia, Far East, and Oceania area 23%. In South America, a decrease of 3% from 1958 was reported.

Among individual products, world demand for residual fuel oil increased 7%,

TABLE 1—WORLD CONSUMPTION OF PETROLEUM*
(Thousands of Barrels Daily)

	Preliminary 1960	Estimated 1961	Percent Increase
Canada	840	865	2.5
USA	9,651	9,900	2.6
Mexico	275	292	6.2
Total North America	10,766	11,084	2.9
South America and Caribbean	1,330	1,410	6.0
Total Western Hemisphere	12,096	12,494	3.3
Western Europe	3,870	4,250	10.0
USSR and satellites	3,000	3,300	10.0
Total Europe	6,870	7,550	10.0
Africa	510	535	5.0
Middle East	580	610	5.2
Asia and Australasia	1,535	1,648	7.3
Total Asia and Africa	2,625	2,793	6.4
Total Eastern Hemisphere	9,495	10,343	8.9
World Total	21,590	22,837	5.8

*WORLD PETROLEUM preliminary estimates for 1960 and forecasts for 1961. Figures are on basis of crude and other hydrocarbon liquids equivalent, and include manufacturing, shipping, and storage losses. USA figures are from recent study by the Independent Petroleum Association of America.

TABLE 2—APPARENT DEMAND MAJOR REFINED PRODUCTS

(U. S. BUREAU OF MINES)

Country or Area	1958	1959	% Change
Canada	662,170	730,240	10.3
Costa Rica	3,520	3,040	— 13.6
Cuba	60,950	77,890	27.8
Dominican Republic	6,600	4,980	— 24.5
El Salvador	4,590	3,360	— 26.8
Guatemala	7,840	8,490	8.3
Haiti	1,920	1,630	— 15.1
Jamaica	12,320	14,650	18.9
Mexico	233,860	218,780	— 6.4
Nicaragua	3,050	2,920	— 4.3
Panama Canal Zone	14,800	14,310	— 3.3
Panama	6,520	7,650	17.3
Puerto Rico	30,550	31,990	4.7
Trinidad	42,810	42,330	— 3.5
USA (Incl. Alaska & Hawaii)	7,587,690	8,096,030	6.7
NO. AMER. & CARIBB.	8,679,440	9,258,290	6.7
Argentina	238,870	227,510	— 4.8
Bolivia	5,650	5,510	— 2.5
Brazil	214,380	218,540	1.9
Chile	38,260	41,640	8.8
Colombia	46,830	49,000	4.6
Ecuador	8,400	9,180	9.3
Neth. Antilles	156,960	78,490	—100.0
Paraguay	1,610	1,750	8.7
Peru	41,620	41,530	— 0.2
Uruguay	25,670	27,070	5.5
Venezuela	127,420	131,470	3.2
SO. AMERICA	905,670	835,170	— 7.8
Austria	39,590	45,960	16.1
Belgium & Luxembourg	123,470	105,180	— 14.8
Denmark	87,440	89,750	2.6
Finland	27,810	36,920	32.8
France	398,840	414,120	3.8
Germany, West	372,240	466,930	25.4
Greece	36,060	31,780	— 11.9
Iceland	6,520	8,010	22.9
Ireland	21,010	21,830	3.9
Italy	280,230	295,810	5.6
Netherlands	157,620	181,130	14.9
Norway	62,370	61,870	— 0.8
Portugal	28,130	24,340	— 13.5
Spain	78,940	78,430	— 0.7
Sweden	190,620	206,990	8.6
Switzerland	63,310	61,890	— 2.2
United Kingdom	680,690	790,600	16.1
Yugoslavia	20,660	22,350	8.2
WESTERN EUROPE	2,675,550	2,943,890	10.0
Aden	66,930	62,640	— 6.4
Bahrain	17,970	14,700	— 18.2
Iran	77,430	97,000	25.3
Iraq	33,130	31,540	— 4.8
Israel	28,710	53,350	85.8
Jordan	3,450	3,130	— 9.3
Kuwait	52,650	61,880	17.5
Lebanon	12,340	15,300	24.0
Saudi Arabia	38,410	38,220	— 0.5
Turkey	39,060	38,350	— 1.8
UAR, Syria	13,910	14,320	2.9
MIDDLE EAST	384,970	439,240	14.1
Burma	7,990	10,360	29.7
Cambodia & So. Vietnam	12,810	14,680	14.6
Ceylon	18,430	19,270	4.6
India	118,910	122,860	3.3
Japan	323,440	400,290	23.8
Korea, South	13,540	28,940	113.7
Malaya & Singapore	71,950	65,310	— 9.2
Pakistan	39,380	27,450	— 30.3
Taiwan	14,150	28,810	103.6
Thailand	17,630	20,500	16.3
ASIA	638,230	738,470	15.7
Algeria	21,370	19,400	— 9.2
Angola	3,610	3,720	3.0
Belgian Congo	10,100	9,440	6.5
Canary Islands	17,990	14,980	— 16.7
Ethiopia	2,310	1,910	— 17.3
States formerly in Fr. Equat. Africa	5,240	5,850	11.6
Fr. West Africa	28,860	11,110	— 61.5
Ghana	7,830	7,530	— 3.8
Kenya	14,660	13,040	— 11.1
Liberia	1,160	1,060	— 8.6
Madagascar	2,610	2,610	—
Morocco	13,660	14,840	8.6
Nigeria	12,050	14,880	23.5
Rhodesia & Nyassaland	10,220	10,600	3.7
Sudan	8,730	8,580	— 1.7
Tanganyika	4,960	5,100	2.8
Tunisia	8,040	8,960	11.4
Uganda	2,920	2,690	— 7.9
Union of So. Africa	72,450	67,340	— 7.1
UAR, Egypt	75,150	83,010	10.5
AFRICA	323,920	306,650	5.3
Australia	179,710	191,230	6.4
Indonesia	65,990	71,370	8.2
New Caledonia	1,070	1,030	— 3.7
New Zealand	34,430	34,880	1.3
Philippines	40,550	50,060	23.5
OCEANIA	332,970	347,800	4.5
WORLD TOTAL, excl. USSR, EAST EUROPE & MAINLAND CHINA	13,940,750	14,869,510	6.7

NOTES: Table shows the totals for five major products only: motor and aviation gasoline, kerosine and jet fuel, distillate fuel oil, residual fuel oil, and all lubricants incl. grease. Does not include other refined products and refinery fuel and loss except USA for 1959, where refinery fuel loss is included with residual fuel and other.

Demand in Netherlands Antilles, Trinidad, Aden, Kuwait heavily influenced by bunker loadings and stock changes.

TABLE 3—THE CHANGING EUROPEAN PRODUCT DEMAND

	Million tons		Increase	% of fuel prods	
	1958	1968	%/yr	1958	1968
Refinery gas*	1.1	3.4	12	0.9	1.7
LPG	2.1	7.7	14	1.7	3.8
Gasolines	26.3	40.2	4.4	21.0	20.1
Kerosenes	5.0	9.1	6.1	4.0	4.6
Gas/diesel oil	31.3	63.2	7.3	25.0	31.6
Fuel oil	59.2	76.3	2.6	47.4	38.2
Others	3.6	15.0	12		
Total products	128.6	214.9			
Refy fuel & loss	8.6	15.0			
Total crude oil	137.2	229.9	5.2		

* or light gas-making fractions.

distillate fuel oil 2%, gasoline 4%, and lubricants 3%.

The long term outlook for relative product demand in Europe was the subject of a detailed study recently concluded by M. E. Hubbard, head of economic relations for British Petroleum Co., London. In a paper presented at the Institute of Petroleum in London last month, Mr. Hubbard forecast an average annual increase in total crude demand of 5.2% for Europe. His studies were based on a careful analysis of Europe's changing energy pattern as affected by the various important end uses.

Table 3 shows the 1958 demand in comparison with that for 1968, as well as the expected trends in demand for individual fuel products. "The question of non-fuel products is a difficult one to resolve," Mr. Hubbard pointed out. "The figure for 1958 given in OEEC statistics seems to be low, but had, for arithmetical reasons, to be accepted for this study. With the rapid increase in petroleum chemicals, etc., a 1968 requirement of 15 million tons has been assumed, but no attempt made to forecast from which part of the barrel it would originate."

Mr. Hubbard's three conclusions were:

(1) Although the gasoline proportion itself will continue to fall marginally, this will be more than compensated by the sales of refinery gas (or gasoline components) to gasworks and by LPG. The total "gasolines and lighter" materials should show a small increase in percentage.

(2) Fuel oil or residuals will drop considerably to below any percentage known in Europe in the last ten years.

(3) Middle distillates will rise to a proportion considerably higher than in the past, kerosine remaining roughly constant and the whole of the increase being concentrated in gas/diesel oil, particularly of the heating grades. END

The outlook for USA petroleum demand~1961

by V. B. Guthrie*

THE FORECASTS of demands on USA suppliers of petroleum in 1961 emphasize these five longe-range trends in the pattern of petroleum requirements:

(1) A continuing slowdown in the overall rate of consumption in the USA and in its export trade.

(2) A growing demand for kerosine for jet fuels, which will pull on refiners' supplies of light distillates and may bring changes in the properties of some distillate products.

(3) A small rate of gain in demand for lubricants, which spotlights the need for refiners to find means to widen the markets for their lubricating oil stocks.

(4) More attention being given to developing profitable markets for the so-called minor petroleum products, such as LP-Gas, refinery gases, wax, coke and asphalt, because of the intense competition in the gasoline and fuel oil markets.

(5) Continued expansion in the petrochemicals market, which is a dramatic achievement in the manufacture of products of higher value than as fuels from petroleum and natural gas.

1961 Requirements. Total USA demand for petroleum products, under normal economic conditions, is expected to reach 10,098,000 b/d average, by 1961, which is 2.2% greater than in 1960. Revised estimates indicate total demand in 1960 was 2.2% greater than in 1959. The greater part of the 1961 improvement is expected to take place during last half of the year.

Gasoline demand in 1961 will average 4,228,000 b/d, an increase of about 3% over the 4,138,000 in 1960. Gasoline exports will average 40,000 b/d. There will be a decline of several thousand b/d in the volume of aviation gasoline marketed.

With normal winter temperatures, distillate fuel oil requirements are forecast at 1,910,000 b/d, 2.4% greater than in 1960. Residual fuel oil demand is expected to continue to drop. Total exports are forecast at 198,000 b/d compared with 206,000 b/d in 1960, a moderate rate of decline compared with that in 1960 and 1959.

Adequate crude runs for 1961 are set at 8,215,000 b/d average, 1.8% greater than estimated actual runs in 1960, but lower than the forecast rate of gain in product demand in 1961. Under balanced supply and demand conditions this would provide for moderate reductions in refiners' product inventories through the year. Higher gasoline yields, however, as in 1960, could offset the holding down of crude runs and continue to maintain gasoline stocks at higher than adequate levels. Table 1 gives the details of 1961 domestic demand forecasts, by quarters.

After 1961? Total petroleum demand as forecast continues the trend toward a slowdown in overall consumption which has been in effect the past few years. Many authorities predict an average rate of gain in total requirements of around 3% annually for the early years of the 1960-70 decade. The chart in Fig. 1 shows the total rate of gain since 1955 has been 15%, while in the five years from 1950 through 1955, it was 30%.

Several factors have contributed to the slowdown in petroleum consumption. The rate of gain in gasoline demand has been half that prior to 1955. Besides reflecting the rate of industrial activities, the high motor fuel taxes and cramped highways in some areas have discouraged gasoline use. The demand for aviation gasoline will drop as the commercial airlines and military services increase the number of gas turbine-powered aircraft they operate. In 1961, the expected 10% of small cars in the USA total passenger car population will begin to cut into motor gasoline consumption.

In the five years prior to 1955, distillate fuel oil demand increased 47%, principally due to the expanding distillate heating oil market. In the last five years, growth in distillate demand has increased a scant 20%. Competition with natural gas and the drying up of the burner conversion market have been the principal factors in the slowdown in heating oil requirements. Exports of distillate fuel oils also have declined since 1955.

The 1960-70 decade will see the consumption of many products growing at a higher rate, many authorities believe. The expanding population and industrial economy is expected to increase the number of passenger cars in operation by 30 million by 1970, automotive authorities believe. The 90 million passenger cars then in use will create a market for 1.8 billion barrels of gasoline annually. Trucks now use 27% of the USA motor fuel consumption and this percentage is expected to increase. More leisure time for recreation will stimulate driving and gasoline consumption. Highway building will lessen some of the congestion that now keeps cars off the road. Of the proposed 41,000 miles of highway construction, only 9,600 miles have been completed thus far. The use of gasoline in water craft is already expanding rapidly.

The development of more efficient types of burners is expected to give impetus to greater use of oil in home heating and in such other home appliances as water heaters, in the face of competition with natural gas and, possibly in coming years, with electricity.

An intangible, but perhaps important, factor in future petroleum demand may be the joint programs which are being set up by the oil companies to promote the use of their own products. One such program has as its objective promoting travel to increase gasoline consumption. Another, in cooperation with burner manufacturers, provides for a mutual effort to sell the public the advantages of oil heat. Through the American Petroleum Institute, the oil companies the past year have been advising motorists that more frequent oil changes than are now recommended by many car manufacturers will insure longer life for their engines.

This is the first time the oil companies cooperatively have taken the initiative to build up the markets for their products. As one oil company executive expressed it, heretofore they have waited for the inventor of some oil-consuming device to create a market for their products.

The New Role for Kerosine. The kero-

TABLE 1—FORECAST OF 1961 PETROLEUM PRODUCT DEMAND—USA
(1,000 b/d average)

	1960	% Change from 1959	1st Quarter 1961	2nd Quarter 1961	3rd Quarter 1961	4th Quarter 1961	Year 1961	% Change from 1960
Gasoline	4,138	+ 1.8	3,805	4,450	4,485	4,170	4,228	+2.2
Kerosine	361	+19.9	525	250	290	495	390	+8.0
Dist. Fuel Oil	1,865	+ 3.1	2,745	1,405	1,240	2,250	1,910	+2.4
Resid. Fuel Oil	1,530	— 1.0	1,900	1,340	1,210	1,605	1,514	—1.0
Other Products	1,783	+ 3.1	1,735	1,800	1,985	1,910	1,858	+4.2
Total Domestic	9,677	+ 2.4	10,710	9,245	9,210	10,430	9,900	+2.3
Total Export	206	—13.1	196	206	198	196	198	—3.9
Total Demand	9,883	+ 2.2	10,906	9,451	9,408	10,626	10,098	+2.2
Runs to Stills	8,070	0.9	8,162	8,132	8,165	8,393	8,215	+1.8

Authority: Supply and Demand Committee of the Independent Petroleum Association of America

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sine consumed as jet fuel will be provided from the middle-of-the-barrel fractions which the refiner processes from crude oil. The distillate fractions now must supply about 600,000 b/d of diesel fuel oil and about 1,200,000 b/d of heating oils. They also supply charge stocks to refiners' cracking stills. Present requirements for kerosine for heating fuels, illuminants and other purposes are around 300,000 b/d. Consumption of kerosine as jet fuel is now adding about 100,000 b/d to these requirements, and jet fuel needs will be around 300,000 b/d by 1965, it is predicted.

To supply these added requirements, without unduly increasing crude runs, refiners will be called upon to adjust their kerosine yields and perhaps to change the properties and simplify some of the products they make from their distillate fractions recovered from crude oil.

Lube Oils Remain a Problem. Most of the trends which have affected demand for lubricating oils the past few years will continue, as far as authorities can see at present. Domestic and export needs in 1960 were estimated at about 58,000,000 barrels total.

Automotive oils, which make up about 50% of total demand for lubes, have been affected by the lengthening of the drain period for crankcase oils now recommended by many car manufacturers. The effect on motor oil requirements of the smaller cars, with their smaller crankcase capacities, is not yet established. This past year the oil companies have taken the initiative in advocating more frequent oil changes. The rate of increase in demand for industrial lubricants, which represent about 35% of total lube demand, will follow the growth in industrial activity in the USA. Gains in the export trade in lubricants are not expected in view of the increase in productive capacity abroad. In 1960 lubricant capacity in refineries in Europe is estimated at 60,000 b/d. Export shipments of lubricants from the USA in 1959 totalled 14,133,000 barrels.

The varied non-lubricating uses of lubricating oils now consume about 12% of total requirements. These uses include spraying, heat transfer, flotation, and many processing applications. Research by oil companies and other interests may widen this market for lubricants in coming years.

The "Other" Products. The current rate of growth of the so-called lesser petroleum products reflects the increased attention given them by many oil companies today. They are proving an avenue to the development of new markets more profitable than the highly competitive markets for the mass volume fuel products. One refiner announced to stockholders the adoption of a policy of diversification and sale of specialty and petrochemical products, as a means of strengthening its competitive position, since conventional refined products were likely to be in over-supply for some years.

As shown in the chart in Fig. 2, USA demand for the minor products more than doubled from 1950 through 1960, while total petroleum demand increased 48%. The minor products include LP-Gas, jet fuels, lube oils, wax, asphalt, coke and still gases. One of these products, LP-Gas, has already reached volume proportions and a third of its output goes into the manufacture of chemicals and synthetic rubber, rather than fuel uses. Still gases, formerly used as refinery fuel, now are also source materials for petrochemicals. Jet fuel demand, excluding kerosine used as jet fuel, is over 125 million barrels a year and facing greater growth.

Large rates of growth have been shown by some of the small volume products and by-products in minor classification. Petroleum wax sales have more than doubled in the past decade, with several times more wax being used for impregnating paper and wrappings than in the manufacture of candles, formerly the only wax market. The volume of petroleum coke marketed has increased 150% in the last 10 years, even though it is a by-product of thermal cracking. Used in part as domestic and industrial fuel, in refined form it has found markets as anodes in aluminum manufacture, in ferrous metallurgy, and now in nuclear applications.

Twice as much petroleum asphalt is consumed as 10 years ago and in many new applications, although its largest market is highway construction.

Petrochemicals are an example of the development of entirely new markets for source materials from natural gas and petroleum which were formerly sold as fuels or were by-products of the manufacture of other products. Both oil and chemical companies are engaged in this field, which is a development entirely within the past two decades.

Total outputs in 1959 of the varied group of petrochemicals was 48.8 billion pounds. Included was ammonia, sulfur, fertilizers, detergents, pesticides, additives, pharmaceuticals, cosmetics, and materials for plastics, synthetic fibers and synthetic rubber, to mention a few items. Some authorities forecast petrochemical output will be 80 billion pounds by 1965.

The value as chemical products of the petrochemicals produced in 1959 was $6.01 billions. This is almost half the retail market value of the refinery production of gasoline in that year. It represents the dramatic achievement in developing new, more profitable markets for petroleum and natural gas. END

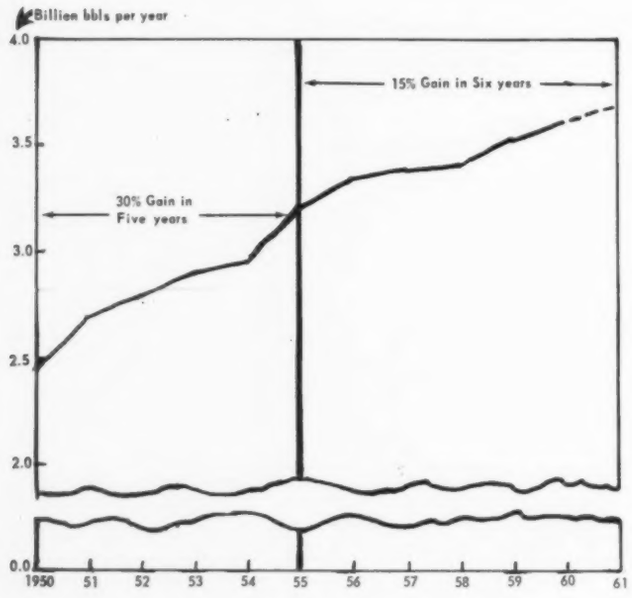


Fig. 1
Total yearly demand for petroleum products from USA suppliers, 1950-1961

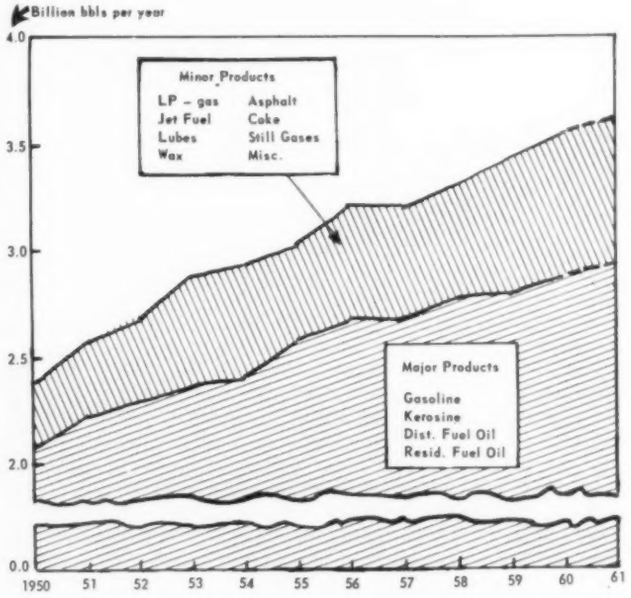
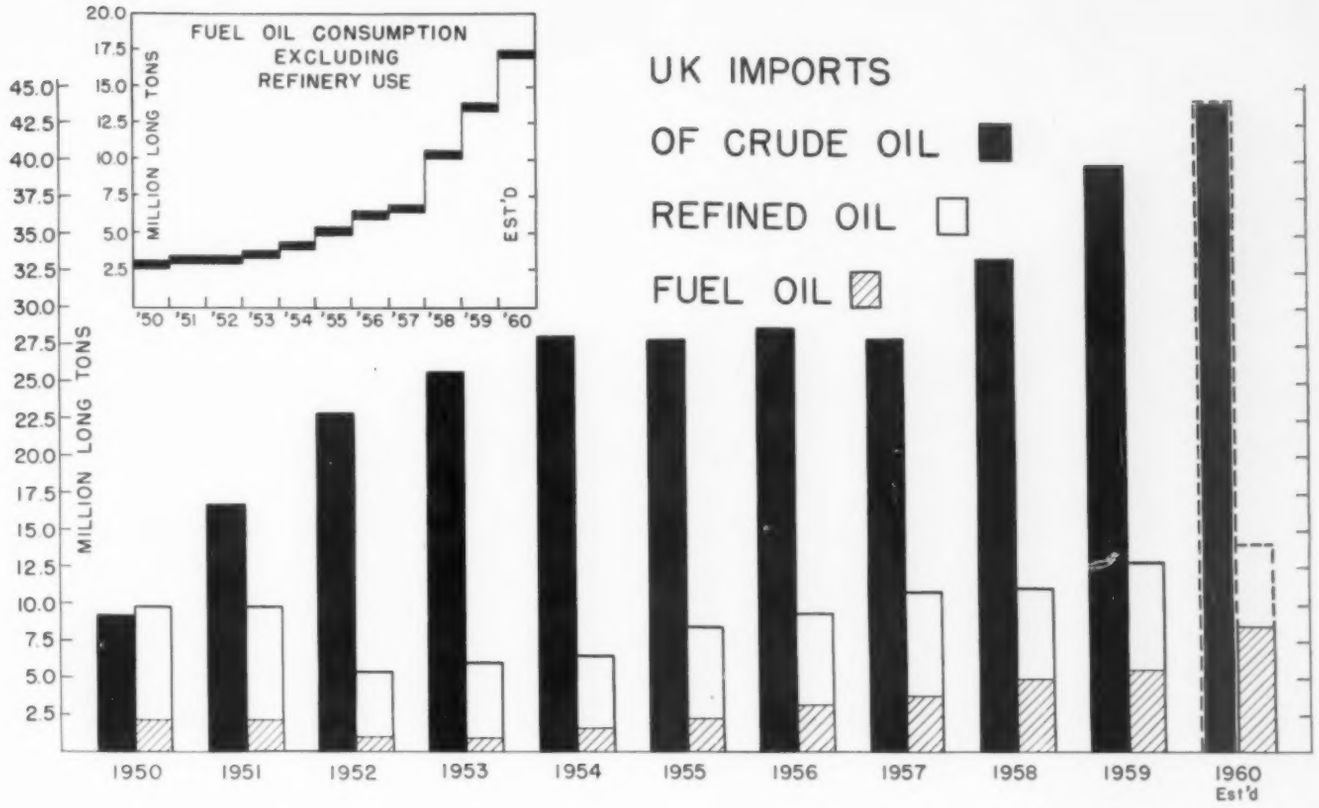


Fig. 2
Relative growth of USA demand for major and minor products



Ten-year trend in United Kingdom imports shows that despite great rise in crude imports, refined products imports still show a steady rise, with fuel oil taking a strikingly larger share

The UK oil industry – 1960

by Cecil W. Wood
European Editor

THE ROLE OF PETROLEUM in UK fuel economy continues to grow steadily in importance, as evidenced by the figures in Table 1 from Ministry of Power "Statistical Digest 1959".

The rise in the share taken by oil is not surprising in the face of a recent assertion by the National Coal Board chairman that oil was replacing coal in the UK in the first six months of 1960 at an annual rate of 38 million tons, an increase of 22 million over the annual rate in 1956.

Nor is it surprising from the fact that the Central Electricity Generating Board has increased its oil consumption from a mere 250,000 tons in 1956/57 to 3.2 million in 1958/59 and 4.5 million in 1959/60 —a rise in coal equivalent of some 7.5 million tons in but four years.

The gas industry, too, is using steadily increasing quantities of oil for coal gas enrichment—749,900 in 1959/60 against 666,700 tons in 1958/59—while the amount of refinery gas bought rose to 113.1 million

Table 1—United Kingdom Fuel Consumption

	Oil[1]		Coal, etc.[2]		
Year	Million tons[3]	Per-cent	Million tons	Per-cent	Total Mill. tons
1959	47.5	19.3	125.1	50.8	246.0
1958	42.0	16.9	134.9	54.3	248.3
1950	21.7	9.6	144.9	66.7	224.8

[1] Direct use. [2] Includes coke, other solid fuel, and coke oven gas. [3] Coal equivalent.

"The new bulk organic chemicals — plastics, synthetic rubber, synthetic ribers—are showing vigorous expansion which is likely to continue for many years to come."—S. P. Chambers, CB, CIE, Chairman, Imperial Chemical Industries Ltd.

Table 2—United Kingdom Oil Imports
(Jan. to Sept., in 1,000 bbls)

	1960	1959
Crude Oil	244,677	220,100
Refined Oil	76,176	69,687
Totals	320,853	289,787
Value, £M.	355.6	348.8

therms from 64.7 million therms, accounting for 4.0% of the total town gas supply against 2.2%. Consumption of gas oil for town gas enrichment is estimated by Esso Petroleum as doubling in the next five years.

The expansion of the import picture in the first nine months of the year is portrayed in Table 2, showing a rise of 11.2% for crude oil, 9.3% for refined oil, and 10.7% for total imports over the same period of 1959.

Liquid product exports are also running higher, totalling 46,710,900 bbls (value £69.9 million) against 40,358,300 bbls (£64.8 million) over these periods.

On this basis it could be assumed that 1960 imports would total about 430 million bbls, of which 330 million would be crude, though this may well be an underestimate by reason of the startup of Esso Petroleum's Milford Haven refinery and the higher throughput of British Petroleum's Kent refinery.

It is thus not surprising that 1960 was a year of great activity, and none less than in the field of improving and reducing the cost of distribution.

Outstanding in this connection is the equipping of one of Shell Mex and B.P.'s latest installations as an experimental center for the automatic control of all aspects of product receipt and distribution. If these methods prove successful, as they seem likely to do, they may be integrated gradually into the company's nationwide system and thus mark the advent of the completely automatic center. The main interest lies in the development of an unique apparatus known as DORIS—Direct Order Recording and Invoicing System. This enables the operator receiving an order by telephone (and 85% are received this way) to carry out the processes of ordering, invoicing, accounting, preparing installation statistical data, and all other necessary clerical operations automatically by push-button control as the order is received.

Though in limited areas, 1960 was an intensification of gasoline price-cutting by smaller independents and the practice is said to be spreading to retail stations selling the majors' nationwide brands at reduced prices, if only to favored customers. Intensified competition in all avenues of oil trading appears certain this year and the majors are faced with the entrance of at least two new influential competitors. These are Total Oil Products (G.B.) Ltd. and The Rank Organisation.

Meanwhile the major distributors have another problem: preparing their case to convince the monopolies commission that the "solus site" or "tied garage" system of retail gasoline sales is not against the public interest.

An interesting 1960 development was the introduction by Mobil Oil on the UK market—the first outside the US—of gasoline brands incorporating "Tetramel" (tetramethyl lead) instead of the long predominant tetraethyl lead.

As to deliveries into inland consumption, against a rise of 17.5% in 1959 over 1958—to 36.5 million (long) tons from 31.6 million—the indications are that the 1960 increase will be even higher. Based on the official "Digest of Statistics", deliveries totalled 25.3 million tons in the first eight months of 1960 against 21.3 million tons in the same period of 1959, a rise of 18.4%. All indications point to a 1960 total of 39.5 to 40 million tons at least.

An article, "Tomorrow's Markets" in Esso Magazine (Autumn 1960), suggests as a "reasonable" forecast that UK demand will have risen to 50 million tons by the middle 1960's, reaching 57 million tons in the early 1970's. Barring a complete change in government thinking on national fuel policy, particularly in regard to fuel oil, it would not be rash to regard this an underestimate: if consumption continues to rise at only half the 1958-60 rate the 50 million mark may well be passed in 1963.

Naturally the great rise is found in fuel oil; deliveries (excluding refinery consumption) over the first eight months being 11.0 million tons against 8.6 million in the same period of 1959, a rise of 27%. On this basis the 1960 total may be the huge one of 17.5 million tons—and the peak appears a long way off.

The Labor Party and Trade Union Congress has again urged the government to restore the tax on fuel oil (a figure of 1½d/gal or 30s/ton is mentioned) and to use the revenue to reduce the 2s6d/gal tax on diesel engine road fuel. The latter's "fuel policy statement" also wants the government to seek voluntary oil company regulation of imports, to investigate fuel oil production costs and price policies in general, and to revert to coal any dual-fired power stations now burning oil.

The government remains firm in the policy of refusing to restrict oil imports, to allow fair competition between the various fuel elements, and to let the fuel user have freedom of choice.

In a House of Lords debate in October, the Paymaster-General asked where the sense would be in taxing fuel oil except as a revenue-raiser. The UK produced more fuel oil than it consumed, and exports (including bunkers) were in excess of imports. UK "invisible earnings" on oil, he stressed, "are normally more than enough to cover the cost to the balance of payments of the total UK imports of oil." He thought these facts should put the matter in better perspective.

Orders for materials and equipment placed in the UK by oil companies totalled £90.3 million in the first nine months, compared with £83.2 million in the same period of 1959 and £117.3 million in the full year.

As to motor fuel consumption, monthly average deliveries of gasoline and diesel engine road fuel combined were 844,600 tons for the first eight months of 1960, a rise of 8.8% over the 775,900 tons average for the same 1959 period.

Ministry of Transport annual September census returns gives the number of vehicles (excluding government owned) in use as being: 1959—8,604,980; 1958—7,902,313; and 1954—5,770,447.

In this connection the recent statement of the Minister of Transport, that "we are having to cater for 15 million vehicles in 1975 against 8.5 million now" would appear to be strongly challenged by the Road Research Board.

In its report for 1954 it pointed out that if traffic continued to increase at the rate then current—roughly 6% per annum—the number of vehicles on the road in 1963 would be almost double what it was then. The 1959 report states that the rate of increase has in fact accelerated, averaging 7% between 1951 and 1958, and 12% between 1958 and 1959. If the current trend continues, the board asserts, then estimates of future traffic will once again need drastic revision as there will be 14 million vehicles on the roads by 1966.

An indication of the increasing demand, both industrial and domestic, for liquefied gas is the fact that Calor Gas Ltd. continues to expand and is building several more filling stations. A project is being prepared for government approval by the West Midlands Gas Board for bringing liquefied methane into the Thames Estuary from North Africa, and delivering it by pipeline for gas enrichment at the 40 mmcf/d Lurgi coal gasification plant building near Birmingham. Conch International Methane is reported to be associated with this scheme.

Indigenous crude production by British Petroleum totalled 41,300 tons in the first half of 1960 against 39,840 tons in the same period of 1959 and encouraging oil indications in new areas are being closely investigated.

Refining. The last figure available for capital expenditure on petroleum and shale oil refining is that for 1958, when the total was £39.9 million, being £33.8 million for acquisition of plant, machinery and vehicles, and £6.1 million for new building and civil engineering work. If the expenditure of £36.1 million for ocean tankerage and £42.1 million on wholesale and retail distribution research, etc., be added, the total 1958 capital expenditure for the petroleum industry is put at £118.1 million. This compares with £107.9 million in 1957.

In the Annual Refinery Review (July 15, 1960) it was stated that UK crude refining capacity would exceed 50 million tons a year by end-1960. In view of the wide range that is permissible in the absence of a standard definition of "capacity", it can be said this assertion has been proved correct for all practical purposes. The actual total, as of this date, based on data supplied WORLD PETROLEUM for individual

plants, is 49.3 million tons, as shown in Table 3, comparing with 43.4 million tons end-1959.

Two main factors account for this rise: the bringing in during the second half of the year of Esso Petroleum's 4.5 million ton/year refinery at Milford Haven (Pembrokeshire), and the rise in the actual working rate of British Petroleum's Kent refinery from 7.1 to 9.0 million tons a year following the completion of additional tankage.

Refinery throughput averaged 3,520,700 tons a month over the first seven months of 1960, comparing with 3,237,800 tons in the same period of 1959 and 3,261,300 tons over the whole year.

In July (the last month reported by mid-November) throughput was at a new high level of 3,796,600 tons for a yearly rate of 45.6 million tons. This is a big rise from earlier months and under the circumstances it would be hazardous to suggest the 1960 total.

As to future plants, the great news is that British Petroleum will build a 1,300,000 ton/year refinery at Belfast in Northern Ireland, requiring an initial investment of £8 million. This will be Northern Ireland's first refinery and it will produce gasoline, kerosine, aviation turbine fuels, light and heavy diesel oils, fuel oil and liquefied petroleum gas.

Discussions were proceeding in November for a site on reclaimed land to the northeast of the existing oil storage installations in the Musgrave Channel of Belfast Harbor, with facilities for tankers up to 32,000 dwt. Following site preparation, construction is expected to start during 1961 and the project will take about two years to complete. Products will be marketed in Northern Ireland by Shell-Mex and B.P., but there will be a margin for export.

The belief is growing that the Getty group will eventually enter the UK market through Tidewater Oil Co. (England) Ltd. and will build a refinery near Holyhead (Anglesey, North Wales). An 82-acre site has been purchased with excellent deepwater facilities, with an option on more land. Official permission has already been secured for an ocean terminal and storage installation. The Italian ENI group is also known to be interested in UK refining.

The second half of 1960 saw the purchase by Lobitos Oilfields of the entire ordinary share capital of Manchester Oil Refinery (Holdings) Ltd., thus augmenting its refining capacity appreciably as well as securing other valuable advantages. Late in 1959 Lobitos had acquired another independent refiner—Dussek Bros. Ltd., specializing in products for the electrical, printing and paint industries.

The review of progress on projects in the refining and petrochemical fields which follows is confined to news released since the half-year's summary given in the Annual Refinery Review of July 15, 1960.

A major development is the recent British Petroleum Co. announcement that work has started on the installation of a 23,000-b/d catalytic reformer at its Kent refinery to meet the increasing demand for high octane gasoline. Completion is set for early 1962. This will be the third unit of this type at Kent; the first two, commissioned in 1955 and 1958, have capacities of 6,000 b/d and 10,000 b/d respectively.

BP has also recently completed a 30,000 ton/year special solvents plant at the same refinery, the company's first such plant in the UK.

Shell Refining Co. has brought into use the new system of pipelines for transporting chemical feedstock and various gaseous and liquefied gas streams (e.g., ethane, ethylene and propane-propylene) between its Stanlow (Cheshire) refinery and Shell Chemical Co.'s works at Carrington. The fuel oil, gas oil and gasoline transfer pipelines from Stanlow to the Shell-Mex and B.P. depot at Partington have also been completed.

A new and comprehensive bitumen cutback installation has also been commissioned at Stanlow, while at the Ardrossan (Scotland) refinery a new inline blending system for bitumen cutbacks based on the use of an electronic ratio controller is now in regular operation.

Lobitos is constructing a 5,000-b/d atmospheric/vacuum crude distillation unit and ancilliary plant at Ellesmere Port costing £1.5 million which will replace the existing distillation plant. Completion is due towards end-1961.

Manchester Oil Refinery (now under Lobitos control) is installing a 1,800-kw induction generator driven by a steam turbine operating at 600 psi and passing out process steam at 150 psi against a back pressure of 20 lb.

The principal development at Mobil Oil's Coryton (Essex) refinery in the last half-year is that butane has been added to the range of bulk products available. Propane supplies had been started earlier.

Chemicals from petroleum. The only direct yardstick for measuring progress is the refinery output of feedstock for petrochemical plants. Here there is evidence of considerable increased activity. Refinery deliveries for this purpose were the high figure of 151,300 tons in August, 1960 (the last available) and the 8-month average, at 130,100 tons, showed a 57% rise over the average of 82,700 tons in the same 1959 period. With the rising tendency shown, total petrochemical feedstock deliveries may well be 1.5 million tons in 1960 against just over a million in 1959.

As to the actual output of organic chemicals, a reliable source has stated that whereas this was 718,000 tons in 1954, of which just over a third was based on petroleum, in 1959 the output was up to well over a million tons and the production of petroleum-based chemicals had more than doubled to 48% of the total, and is expected to reach 70% by 1965.

In an article in the Midland Provincial Bank Review of August 1960—"The British Chemical Industry"—S. P. Chambers, CB, CIE, chairman of Imperial Chemical Industries, stresses that because of its diversity and the obscurity of its boundaries, the chemical industry is a difficult one to review, and the statistics are unsatisfactory.

Table 3—Capacities of United Kingdom Refineries

(1,000 ton/yr. at end of 1960)

Berry Wiggins & Co.	
Kingsnorth	160
Weaste	120
	280
Wm. Briggs & Sons	
Dundee	41
British Petroleum Co.	
Grangemouth	3,100
Kent	9,000
Llandarcy	3,000
Pumpherston	180
	15,280
Esso Petroleum Co.	
Fawley	11,500
Milford Haven	4,500
	16,000
Lobitos Oilfields Ltd.	
Ellesmere Port	200
Manchester Oil Ref.*	
Trafford Park	150
Mobil Oil Co.	
Coryton	1,900
Shell Petroleum Co.	
Shell Haven	8,000
Stanlow	5,400
Heysham	1,900
Ardrossan	160
	15,460
United Kingdom total	49,311

* Now Lobitos Oilfields Group.

The latter is certainly true for chemicals based on petroleum. In support Mr. Chambers cites the fact that in the UK census definition synthetic fiber manufacture (but not plastics manufacture) falls outside the chemical category, whilst the OEEC definition also omits synthetic fibers but includes rods made of the same material.

The five extracts from this paper which follow can be taken as reliable indicators of growth in some of the main avenues of petrochemical development:

(A) The growth rate of the plastics sector has outstripped almost every other sector of the chemical industry and shows no sign of abating. In 1959 UK sales of plastics and synthetic resins exceeded half a million tons. Polythene contributed the most of this expansion, and seems likely to continue to do so; it is estimated that production capacity by the end of 1961 will exceed 175,000 tons (including a minor amount of polypropylene), compared with 75,000 tons in 1958. Polyvinyl chloride and polystyrene come next in order of importance.

(B) It has been estimated—"a hazardous procedure," Mr. Chambers terms it—that by 1970 the UK will be producing about 1.25 million tons of plastic materials generally, which represents an average growth rate of 8.7% compound per annum. Polypropylene, at present available in only small quantities, will undoubtedly have a large share in this growth.

(Continued on page 60)

General view of BP's new 100,000-b/d refinery at Dinslaken

BP's new Ruhr refinery now onstream at Dinslaken

THE FIRST STAGE of the new 100,000 b/d refinery of BP Benzin und Petroleum A.G. near Dinslaken, some 15 miles north of Duisburg in the Ruhr, German Federal Republic, has now been commissioned. The main units included in this first stage are two crude oil distillation units, a 10,000 b/d catalytic reformer, a hydrofiner, and copper chloride treatment units. Construction of a second stage now underway will add a catalytic cracking unit with associated vacuum unit, and a bitumen plant.

The BP Group already has two other refineries in Hamburg, Germany. One, the Finkenwerder Refinery, has a capacity of 2,000,000 tons/yr and produces a wide range of petroleum products. The second, Oelwerke Julius Schindler, which has a capacity of 220,000 tons/yr, is a specialties plant producing lubricants and greases. However, forward estimates indicated that the sales of BP products in the Ruhr, southern Germany and parts of Switzerland would, by 1962, have reached an amount calling for new refining capacity in the area. Thus the decision was taken to build a complete new "grass roots" refinery.

Work officially began on the Dinslaken refinery for the BP Group on November 18, 1958. The site covers 700 acres, of which some 300 acres are at present utilized. The sub-soil is sand and gravel, and where heavy foundation loadings occur vibro-compaction has been employed to raise the load-bearing characteristics. The Lippe-Seiten Canal forms the northern boundary of the site. The town of Dinslaken lies about four miles to the south.

Crude oil is supplied to the refinery by the Nord West Oelleitung. This pipeline, which runs from Wilhelmshaven to Wesseling near Cologne, was built by a company in which BP has a 26.3% interest. The pipeline is of 28-in. diameter and has a total length of 200 miles. The present capacity, about 9 million tons/yr, will rise to 15 this year and later to 22 million ton/yr. The jetties at Wilhelmshaven can berth tankers of up to 50,000 tons capacity and will eventually be able to berth three 100,000-ton super tankers simultaneously.

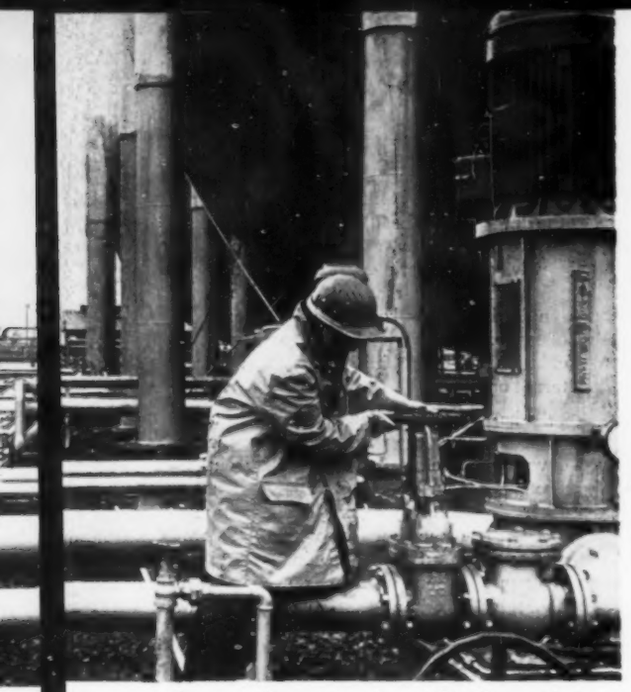
The main processing units in the refinery are two 50,000 b/d crude oil distillation units. The mixed propane/butane cut from these crude units passes to a 6,000 b/d gas recovery plant for the production of liquefied butane and propane for bulk sale.

Light distillates from the crude units are converted into the highest grade motor gasoline components by a 10,000 b/d catalytic reforming unit. There are two 2,400 b/d copper chloride units to treat aviation turbine fuels and other products, while light diesel oils for various automotive and heating purposes are treated in a hydrofiner capable of handling 10,000 b/d of feed. The sulfur extracted by the hydrofiner is processed in a 12 ton/day plant into pure sulfur, for sale in the liquid form.

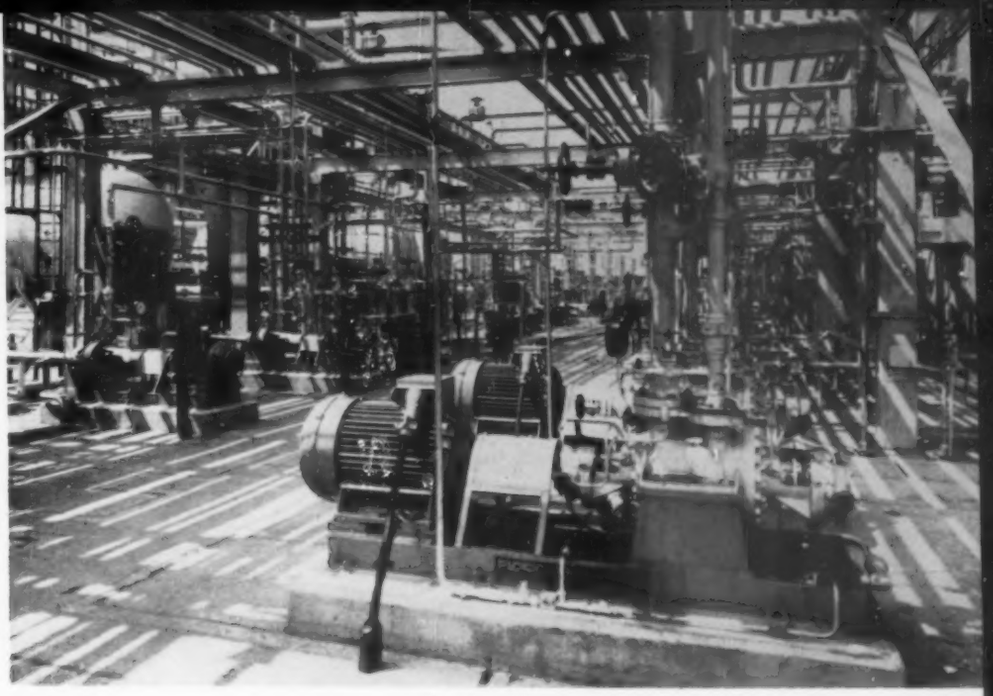
The processing units included in the second stage of construction are a 10,000 b/d catalytic cracker which will increase the output of high quality motor gasoline components. The catalytic cracker will be fed by a 20,000 b/d vacuum distillation unit which will also supply feed for a 100,000 ton/yr bitumen plant. An additional 4,000 b/d copper chloride unit is also to be built.

In the interest of manpower economy, a central control room is provided for the process units included in Stage 1 of the refinery. The instrumentation of the units is almost entirely electronic, and "plug-in" recorders are provided which allow records of selected variables to be made.

A novel characteristic of the control room is the installation of an "in-line scanner." Briefly, this is a block of indicators each representing an important process variable. Each indicator carries an illuminated horizontal line and the instruments are set so that when the unit is steady the individual indicators line up to give a continu-



Operator adjusts gate valve at Dinslaken, with huge Hortonspheres in immediate background and refinery proper in far background



A section of the process area, the sweetening plant

First phase of construction of West German plant completed, including two 50,000 b/d crude distillation units and some of the downstream processing. Work is now under way on second phase of project, which will include catalytic cracking facilities

ous line across the top of the control panel. The deviation of any variable from control shows up as a break in this line. It is considered that this will simplify plant control by enabling the operator to detect deviations anywhere in the plant at a very early stage.

The vacuum distillation unit and catalytic cracking unit designed for Stage II of the refinery will be situated together and served by a common control room. The bitumen plant will have its own control room.

With regard to utilities, processing steam for the refinery units for Stage I is provided by three Babcock Werke boilers each with a capacity of 125,000 lb/hr. of steam at 200 psig. Steam is distributed throughout the refinery at 175 psi.

The cooling water system includes four Bischoff, induced-draft cooling cells capable of dealing with about 28,000 gpm (Imp) of water. Make-up water for the cooling system is drawn from the Lippe-Seiten Canal, and potable water is purchased from the local supply.

Electricity is being purchased from the Rheinische Westfalische Elektriztaetswerke A.G., whose grid power lines run along the western boundary of the refinery site. A transformer station has been built adjacent to the refinery to reduce the grid voltage of 110 kv to 6 kv. Under design conditions in Stage I, the estimated power required for the refinery is about 7,000 KW.

Waste water collected by the refinery drainage system is cleaned of oil in an API separator. Sulfide-bearing wastes are separately treated by air oxidation under pressure. For the effluent from the catalytic cracker in Stage II a biological oxidation plant is being added. The cleaned effluent is discharged into the Lippe River.

There are in all some 80 tanks for crude oil and products, ranging up to 168 ft in diameter. The crude tankage provides net capacity for storage of 15 days throughput, each of the biggest tanks being capable of holding 190,000 bbl of crude oil. These tanks have inverted conical bottoms and are provided with heating coils to reduce sludge formation.

There are relatively limited intermediate tankage facilities, since the refinery is designed to operate as far as possible on an integrated basis.

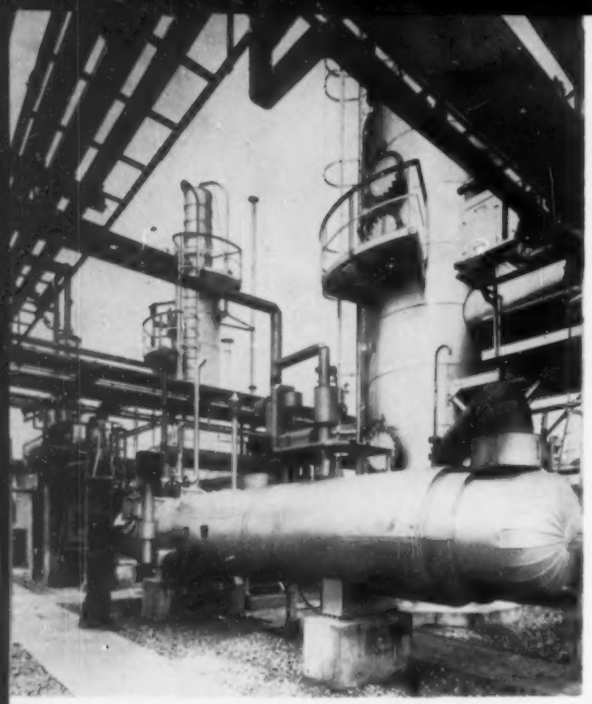
The finished products and component tanks will have a total net capacity equal to about 25 days throughput. The larger quantity will be held in component tanks so that the maximum advantage can be taken of the flexibility which the "in-line blender" system provides. This system delivers the finished products (blended to a guaranteed accuracy of 0.25% per component) to finished product tanks or to suction of the transfer pumps for direct delivery to the Rhine barge loading harbor.

The plates for the tanks were first "edge-prepared" and then rolled to the correct curvature on the refinery site by means of an elaborate plant specially installed for the purpose. Some 20,000 tons of steel plate was used for the tankage.

In total there are some 220 miles of pipeline providing the links between processing units, tankage and despatch areas. There are approximately 275 pumps of various sizes throughout the refinery.

Approximately half of the refinery's products will be distributed by Rhine barges. A harbor has been built for BP at the junction of the Rhine and Lippe-Seiten Canal by a local harbor company. This harbor is about three miles to the west of the refinery and the two are joined by a number of product pipelines. The two jetties in the harbor are able to accommodate up to four barges at one time, each ranging up to 1,000 tons capacity. To build this harbor approximately 1 million cubic meters of soil was excavated or dredged.

The rail loading facilities are of interest. There are four loading tracks each leading to a weighbridge capable of loading all



Sulfur recovery plant at the Dinslaken refinery. A Claus-type, it was supplied as a "package unit" by Lurgi.

products. A "wagon hauler" operated from the weighbridge house automatically engages an empty truck, pulls it on to the weighbridge and, when full, delivers it to the appropriate position. The system can load 180 trucks of an average of 22 metric tons per day. The sidings in the rail despatch area are designed to accommodate two full trains each of 1,500 tons capacity.

Facilities for loading 15 to 30 LPG cars per day with butane, propane or a mixture of both are also provided.

The refinery's rail system is linked by a spur line to the Federal Railways system and marshalling is carried out at Spellen, which is approximately three miles from the refinery.

The remaining 25% of the products will leave the refinery by road. About 200 road tank cars can be loaded each day. Many of them will use the new autobahn about one mile east of the refinery and which allows easy access to the general autobahn system.

The wide range of products from the new refinery will include the highest grade motor gasolines, aviation turbine fuels, marine diesel oils, gas oils, fuel oils, LPG, and petrochemical feedstocks. The latter are to be supplied to the new petrochemical plant of Erdolchemie GmbH which is situated adjacent to the Bayer plant at Dormagen, near Cologne. Erdolchemie is jointly owned by BP Benzin und Petroleum A.G. and Farbenfabriken Bayer A.G., Leverkusen. When Stage II of the refinery is complete, larger quantities of motor gasolines will be produced and bitumen will be added to the range of products.

Near the main gate of the refinery are the administrative buildings, which include the general and process offices and a well-equipped laboratory, a maintenance workshop and store which has an area of 32,500 sq ft. A personnel welfare building and canteen complete the main refinery buildings. The Rhine harbor facility has its own office.

The materials for the new refinery are with certain exceptions from German sources. More than 350 firms (mostly German) have been concerned in its construction. The construction force at its peak numbered 1,700.

Kellogg Refinery Consultants Ltd. have acted in Germany as advisers and consultants to BP Benzin und Petroleum A.G. for the procurement and construction of the refinery.

For Stage I approximately 400 people will be employed in running the refinery. The refinery manager is Carl Piefke. Many of the workers required for the refinery are being recruited in the towns and villages of the area, but some key workers with experience and training in the BP Hamburg Refinery have been brought in.

The new refinery was officially opened October 20 by Federal Minister of Economic Affairs, Professor Ludwig Erhard. Many visitors were at the opening ceremony, including the President of Federation of German Industries, Herr Berg; the President of Duisburg Chamber of Commerce and Industry, Herr Kost; and the chairman of The British Petroleum Co. Ltd., The Hon M. R. Bridgeman. The Minister performed the ceremonial opening by pressing a button which operated machinery in the refinery power house. Visitors then toured the new plant.

After thanking Prof. Erhard for coming to open the refinery, Mr. Bridgeman said that during last 12 years, BP had spent over $201,600,000 on refining, petrochemical, and distribution facilities in Western Germany.

"This refinery is an example of continued call for capital expenditure which is a feature of the oil industry and extends over whole range of its operations," he said, "for BP Group capital expenditure amounted to $1,094,800,000 in last three years alone. Large part of this must necessarily be provided in form of retained earnings and we have over the last ten years reinvested over 70% of our earnings in this way.

"This is one reason why maintenance of reasonable price levels is so important. It is important too from the standpoint of countries in which the oil is produced because revenue from development of their national resources is vital to development of their economies. Maintenance of reasonable and reasonably stable price levels should be matter of common concern throughout oil industry and particularly to those like ourselves who are endeavoring to follow a policy of continuing to serve growing needs of consumers and at the same time recognize responsibilities towards countries in which the oil is produced.

"It is often suggested that seven or eight large companies entirely dominate the international oil business and, while achieving complete unanimity of policy among themselves, form a club to which no further members can be elected.

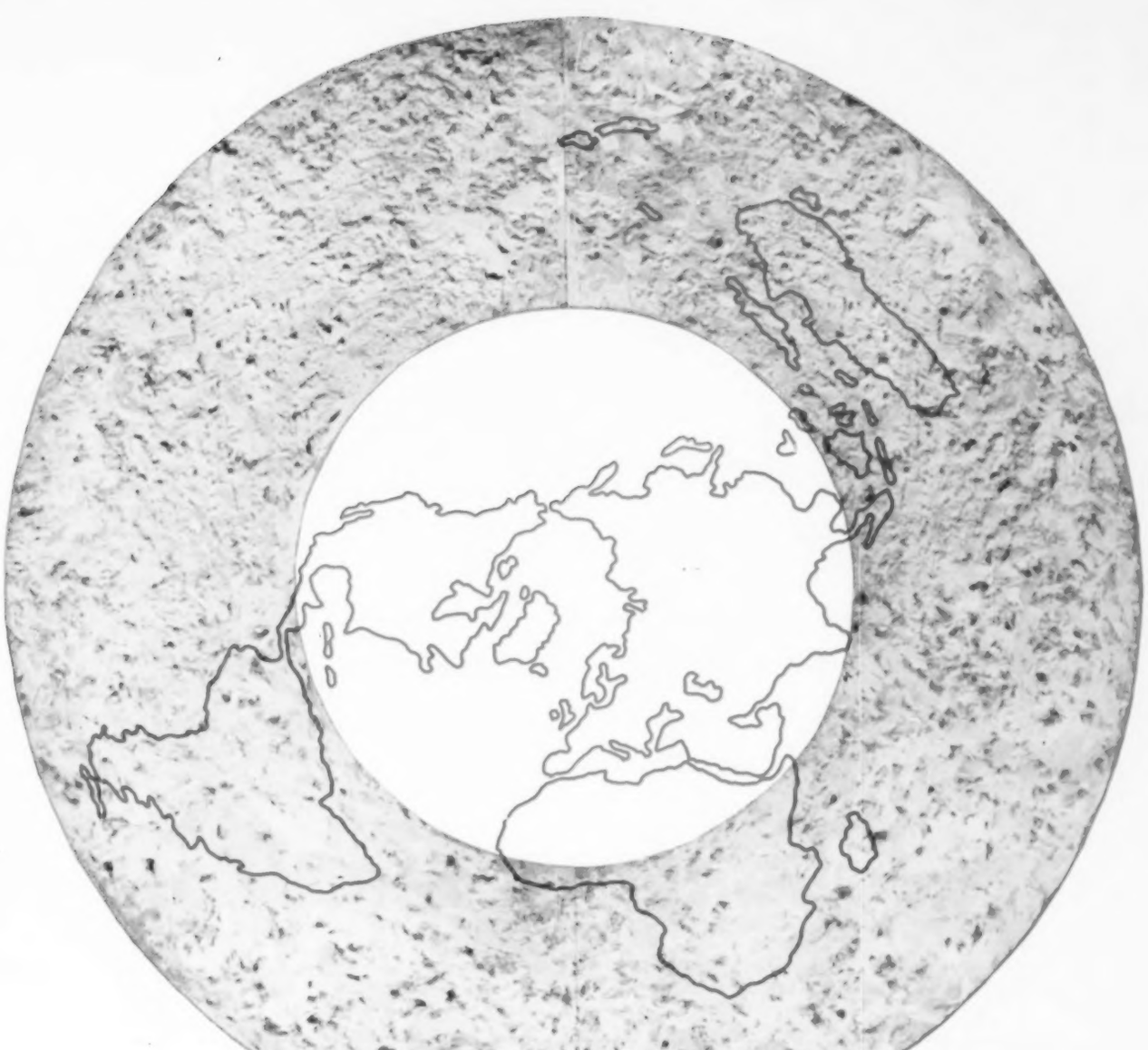
"This is very far from truth. The large companies compete very actively with each other as everyone can see. None of them were born large. Our company is neither the largest nor the oldest. It has achieved its present position, as have its competitors, slowly and laboriously by charging fair prices to consumer and paying fair rent to landlord, and by keeping in the forefront of technical progress and development rather than by disturbing the pattern of international trade.

"The long established companies such as ourselves have been referred to as mainly devoting our efforts to the private end of maximizing our profits. Certainly we, as do other business concerns, seek to make profits; but the implication that that is pursued without regard to interests either of countries from which our raw material is obtained or important to consumers of price paid for oil is unfounded and unjustified.

"I have already referred to the large proportion of our earnings which has to be ploughed back. The dividend we paid last year to our stockholders represented one-third of one cent per US gallon of our sales. The crude oil on which our business is founded is obtained mainly from Middle East, and it is well known that oil operations in those countries are conducted under 50/50 type agreements under which government of producing country receives 50% of the margin between the posted price for crude oil, which in practice is seldom realized, and the cost of production. Under these the oil companies have to provide the risk capital for the search for oil which is frequently unsuccessful and for its production; the governments concerned not being called on to make any contribution.

"More recently some companies entering for the first time into exploration in these areas have claimed that agreements they have made with governments of producing countries are more advantageous to the latter. I believe it would be more rational to defer such claims until there has been actual experience of result of these agreements. The appearance that these give the government concerned a higher proportion of the profits may well prove illusory where government has to provide its share of capital required for development.

"Income of Middle East producing countries from these 50/50 agreements is presently approximately $1,372,000,000 per annum, and whether they will derive as great a benefit from other forms of partnership still remains to be seen. Suggestions have also been made that trade in oil should be transferred from the present commercial basis to be dealt with directly between government of producing and consuming countries. Quite apart from the greater flexibility of the present system from point of view of source as well as quantity and quality, I believe there are greater prospects of peace in world if international commerce can continue to be conducted at the commercial level just as international political affairs are conducted at the political level." END



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TA3612

Growing impact of the compacts on motor fuels in the USA

by William C. Uhl
Processing Editor

THE FIRST ANNIVERSARY of the large-scale introduction of USA-built compact passenger automobiles has now confirmed—and underlined—earlier predictions* that this was a turning point with a profoundly significant effect on the US refining industry and its motor fuel product.

With new car sales in the USA at the end of 1960 hitting a ratio of about three of the "economy" style cars (both domestic and imported) to seven "standard" cars, it now appears fairly certain that the ratio will climb to a 50-50 basis by 1965, and that by that year, 3 out of every 10 cars on the road will be compacts.

In the years before late 1959, forecasts generally were for a continual increase in engine horsepower, in octanes, and in gasoline sales volume. There were, however, several strong forces beginning to work that helped bring Detroit's Big Three—Ford, Chrysler, and General Motors—into the small car field: (1) a rapid growth in sales of the smaller, non-USA built passenger cars; (2) an increase in popularity of the then-small US cars being built by American Motors and Studebaker-Packard; (3) the fast-changing desires and attitudes of the US car buying public, reflected in the 1958 slump in total car sales; and (4) the continually growing heavy tax load on the price of a gallon of gasoline. But whatever the forces or combination of forces were, when the Big Three moved into the picture, the situation changed rapidly.

And now, as the automobile industry swings into the new year, still more economy cars are moving into the market. These new 1961 "compact standards," being built by Pontiac, Buick, Oldsmobile, Dodge, etc., are admittedly not quite as tiny as the Valiants, Falcons, Corvairs, Larks, and Ramblers, but they are still in the direction of lower gasoline consumption and regular gasoline grade requirements.

Furthermore, authoritative reports from Detroit indicate that several US makers are preparing to introduce within a year a series of "compact" compacts, which will compete even more directly with the highly economical imported cars now taking hold with the buying public. For example: Studebaker-Packard plans for the fall of 1961 a car smaller than its present compact, although not quite the Volkswagen size; and Ford is expected to market a small, front-wheel drive car in the latter part of 1961.

What is the outlook? What does the US oil industry see as the probable impact of the compact on motor fuels during the near future? US oil men queried by WORLD PETROLEUM see these effects taking place.

The compact car is not only "here to stay," it will continue to grow in popularity. All refiners surveyed by WORLD PETROLEUM agreed to this. Opinions vary somewhat as to just how great this growth will be. The percentages stated previously were forecast by F. B. Hufnagel, Jr. and Orville W. Magill of Sun Oil Co. in a paper before a recent meeting of the North American Gasoline Tax Conference. Fig. 1 and Table 1 show the trends Sun anticipates through 1965.

A slightly wider range was predicted by a spokesman for Continental Oil Co., who estimated that "compact and imported cars will total about 35% of new car sales in 1960 and about 8% of total registered cars on the road." He estimated that by 1965, the small cars will be running between 43 and 58% of sales and between 24 and 30% of total car population.

Just how great the impact of the small cars will be on motor fuel sales has been a subject of study and comment by many industry people over the past year, including this magazine. As seen by the Sun Oil men, and based on their forecasts as shown in Table 1 and Fig. 1, by 1965 passenger car gasoline consumption will be almost 7% less than it would have been without the compact car. This does *not mean*, they emphasized, that consumption will drop 7% by 1965. Rather, it means it will not rise as high as it should have, had all cars remained standard size. Based on anticipated growth rates in gasoline demand, this means a loss of some 3.3 billion gallons in potential sales (about 210,000 b/d in 1965.

(Continued on page 58)

* "The Changing auto pattern—and its meaning to U.S. refiners," WORLD PETROLEUM, November, 1959, pp. 72-78.

TABLE 1—USA PASSENGER CAR FLEET COMPOSITION
(in 1,000's at end of year)

Year	Total registrations	Standards	%	Compacts	%	Imports	%
1959	59,326	57,024.9	96.1	949.6	1.6	1,351.5	2.3
1960	61,317	56,740.9	92.6	2,824.6	4.6	1,751.5	2.8
1961	63,981	56,704.9	88.6	5,124.6	8.0	2,151.5	3.4
1962	66,171	55,744.9	84.3	7,884.6	11.9	2,551.5	3.8
1963	68,361	54,409.9	79	11,009.6	16.2	2,951.5	4.8
1964	70,551	52,949.9	75	14,259.6	20.2	3,351.5	4.9
1965	72,750	51,348.9	70	17,659.6	25	3,751.5	5.0

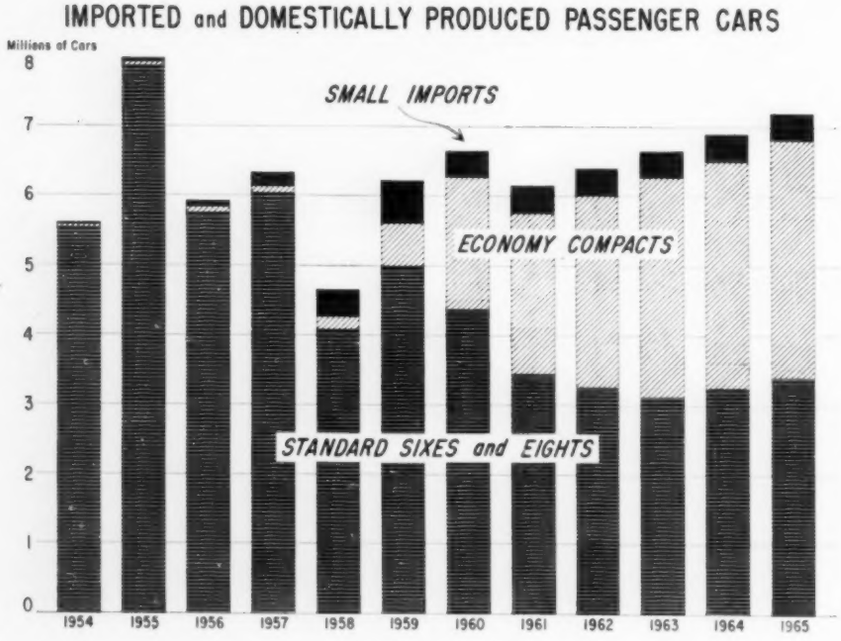

Fig. 1—Annual ratio of passenger car sales by type, from 1955 through 1965, estimated

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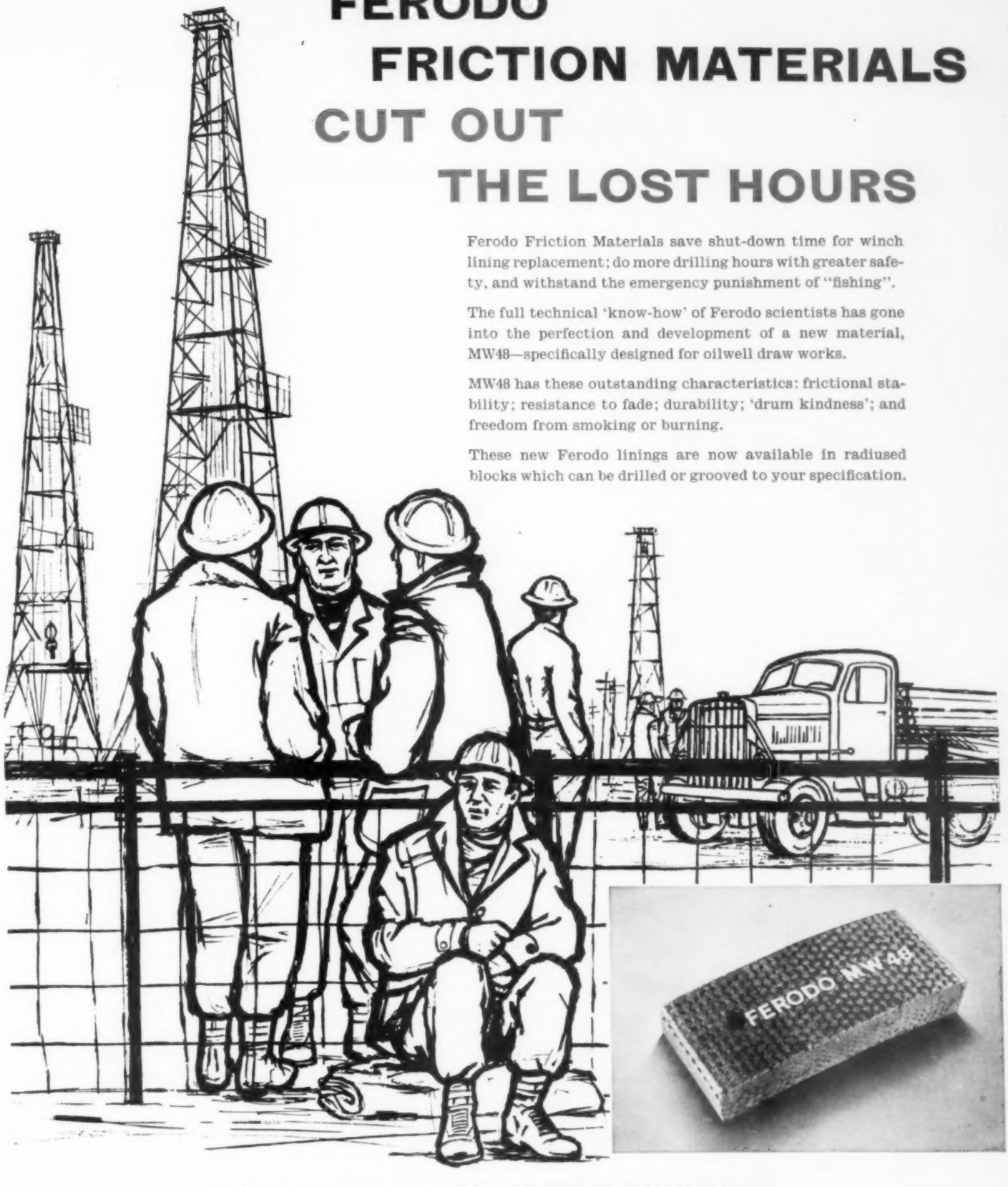

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GX 116

How a computer is used to plan refinery operations

by J. R. Jutras

Two years of successful experience with linear programming have convinced British American of the value of this new technique, and it is now in use at all six company refineries across Canada

Meet the author

J. R. Jutras joined British American Oil Co. Ltd. in 1949, following graduation from the University of Toronto with a B.Sc. degree in chemical engineering.

He served in various capacities at the company's Clarkson, Ontario, refinery until 1954 when he was transferred to the head office manufacturing department in Toronto as Loss and Utilities Co-ordinator. In 1957, he was appointed Operations Planning Supervisor, his present position.

THE BRITISH AMERICAN OIL CO. LTD. has been planning the short range operations of its refineries for the past two years by use of a mathematical method, "Linear Programming," and an electronic computer, the IBM 650.

During this period, the plans produced by this method have been fully implemented: i.e., they have been scrutinized by supervision and management and then converted into detailed monthly operating schedules for implementation by refinery operating departments. They have also provided a basis for control of the company's supply position, for the manufacturing expense budget, for product costing, and for profit and loss forecasting. Implementation and follow-up helped to demonstrate the capabilities of this new technique and it has now become an acceptable method of planning for all six of the company's refineries.

British American is fully integrated, producing about 60% of its crude oil requirements and manufacturing a complete line of petroleum products, which are transported and marketed across Canada. The company operates six refineries, two in eastern Canada, three in the Prairie Provinces, and the sixth in British Columbia.

Manufacturing is coordinated with transportation and marketing operations by a crude and products supply department. This department provides manufacturing with sales estimates translated into product requirements on each refinery, and statements of crude oils available to each refinery. The manufacturing department selects suitable crude oils from those available and attempts to plan its operations for a period of 12-16 months to meet these product requirements at minimum cost.

Historically, operations have been replanned every four months to allow for shifts in product demand, crude availability, refinery process yield, qualities, and variable costs.

Before 1956, crude oil was selected periodically, using the traditional case method. Using judgment, a person experienced in refinery operations would select several potentially good crudes from those available and develop several alternate plans of operation for a 12-month block period. In each case he would apply judgment to the selection of quantity of feed and the mode of operation to be used on each unit to yield products which were blended to meet or exceed final product demands.

Once he was satisfied that each case represented a workable plan and did not violate any capacity or quality restrictions, it was given to the accounting department for costing. Top management would choose from these alternates a case which best fitted their overall objectives. This case was then used as a basis for producing a final detailed plan of operation by refinery staff, which was known as the Refinery Production Assignment.

This procedure gradually became less and less efficient for the following reasons:

(1) Increased complexity and freedom of choice in refinery operation created by construction of new refinery facilities, and tighter product quality specifications made it increasingly difficult to apply rules of thumb and short cut methods to selection of crude oil and modes of operation.

(2) The effect of seasonal variation in product demand and inventory control adjustments on economic selection of crude oil and modes of operation could not be practically evaluated due to the tremendous amount of calculations which would have to be performed manually.

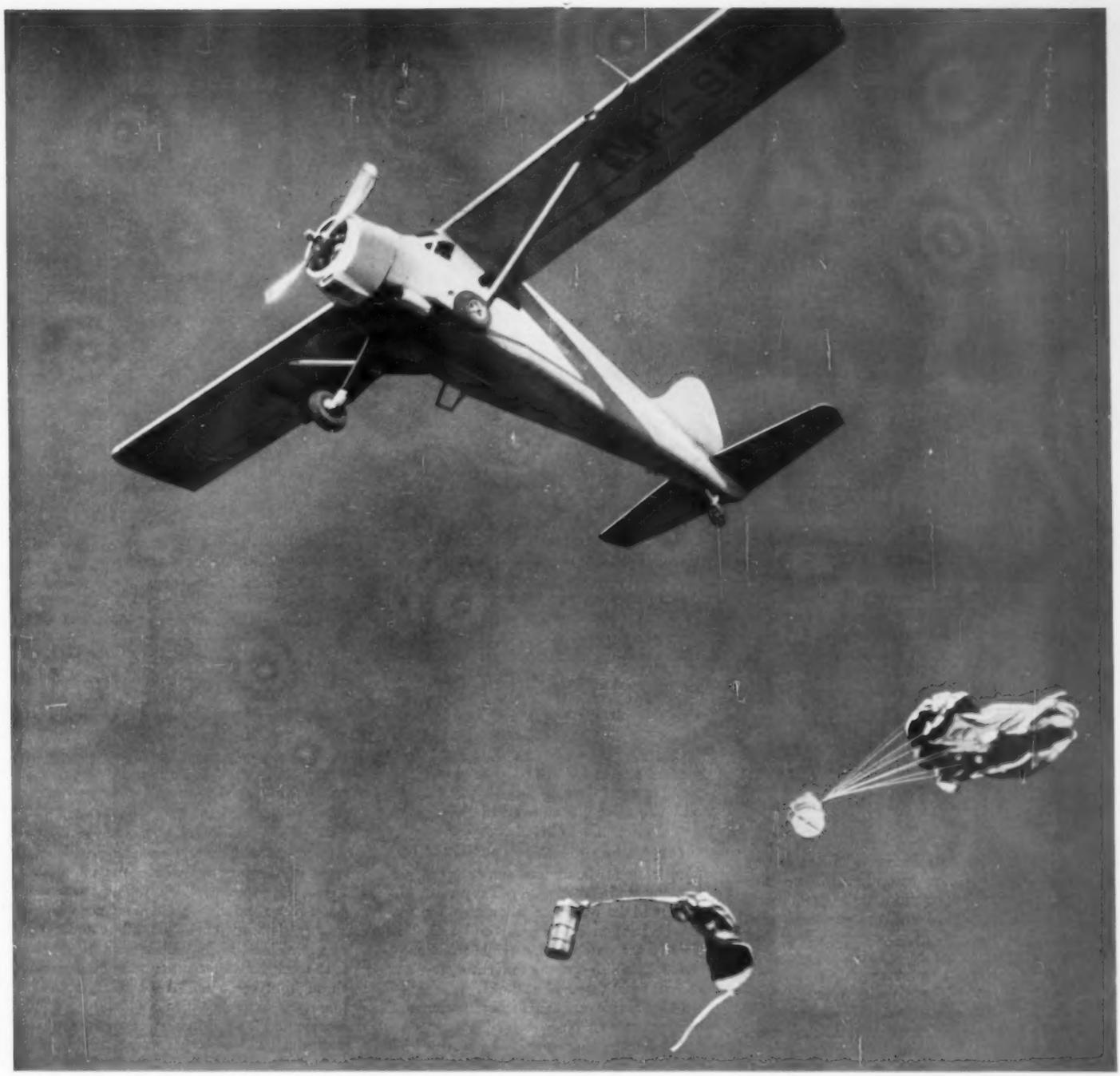
(3) For given conditions and directives, there was no assurance that the final plan was the most profitable, because it was virtually impossible to choose the one best operation among so many alternatives.

The need for improved planning offered a fertile field for electronic computation if techniques could be found to permit an electronic computer to adequately handle the problem. Fortunately, at least two were available—Simulation and Linear Programming. A good deal of preliminary study indicated that Linear Programming was the more flexible and suitable tool for refinery operations planning.

If the problem could be correctly formulated and if the required operational data could be made available, the Linear Programming technique appeared to be capable of selecting from among available crude oils and from the many inter-related refinery unit operating modes and product blends, a combination which would meet given product demands at minimum cost.

However, one of the important limitations on the application of this technique was that all relationships between variables would have to be expressed directly in a linear form or would have to be reduced to linear form through the use of indices, conversion factors, etc.

Development work with this method began in 1956 with the assistance of K.C.S.



Airlift Australia

AUSTRALIA'S Snowy Mountains Scheme has presented some unusual challenges to BP as sole supplier of petroleum products. Some of these challenges have been met in unusual ways, such as fuel drops from aircraft.

This gigantic project, midway between Sydney and Melbourne, with its great dams, power stations, and miles of tunnels and aqueducts, is designed both to provide hydro-electricity and to divert irrigation water westwards into the parched plains.

British Petroleum is proud to be associated with the Snowy Mountains Scheme, one of the world's greatest engineering undertakings.

BRITISH PETROLEUM

BP

Author Bob Jutras, left, and Ben Wilson, right—both of British American—confer with Hugh Fullerton of K. C. S. Ltd. on a plan calculated by the computer which surrounds them. Photo courtesy B. A.

Ltd. as consultants. In addition to providing the programming and computer facility, they trained an ever-widening group of people at British American Oil in the application of Linear Programming and other Operations Research techniques.

At first, simplifying compromises similar to those used in the manual method of preparing an economic case were retained in formulating the scope of the problem for solution. The time period of one year was treated without subdivision, disregarding seasonal variations in demand, and individual products were considered to be pooled in quantity and quality into major product groups.[1]

The formulation of the problem boiled down to four major steps. The first was an analysis of refinery operations to determine the key product qualities, unit operating restrictions, and blending practices that limited flexibility of operation. The second was the attempt to build unit operating models which were reasonably representative of each unit's capability from data submitted to the head office from refineries. The third was the expressing of the results of these steps in logical, linear mathematical form. The fourth was the acquiring of variable cost data that permitted the establishment of the cost function which was to be minimized.

At least two highly significant results emerged from this early work. The first was that Linear Programming was indeed a powerful tool for planning purposes. Realistic results could be obtained which at the very least would give qualitatively valid profit comparison between alternate cases. The second was that historical data which we attempted to use for this purpose was simultaneously incomplete and full of extraneous matter.

Special effort would have to be applied to data gathering and organization if we were to derive maximum benefit from Linear Programming.

By early 1958, sufficient progress had been made in demonstrating the capabilities of Linear Programming that it became an accepted method of evaluating alternative courses of action, and was adopted for use in the area of longer range planning, which is conducted and coordinated by our economic and coordination department.

Shortly before this time, the manufacturing department began to examine the possibility of mechanizing the short range detailed plan of operation known as "The Refinery Production Assignment." The method chosen for this purpose would have to meet the following requirements, in addition to those encountered in the preparation of economic studies:

(1) Produce a sufficiently detailed plan of operation to be understood, accepted, and implemented directly by refinery staff.

(2) Make adequate allowance for seasonal variation in demand and reflect its significance on economic crude selection.

(3) Establish optimum inventory levels at critical times throughout the year.

(4) Provide a basis for evaluation and bidding on spot business.

(5) Be capable of producing plans which integrate well with overall supply planning objectives.

(6) Devote adequate attention to product qualities and reflect their significance on economic choice of operating plans.

To accomplish this task required departure from the system already developed for longer range planning in several important ways. First of all, analysis indicated that it was necessary to divide a year's operation into three 4-month blocks if adequate consideration was to be given to seasonal fluctuations in demand. Secondly, a method had to be devised to control inventories at the beginning and end of each period. Thirdly, the size and speed of the computer available (IBM card 650), together with the need to arrive at solutions in the shortest possible time, forced careful consideration of ways and means of consolidating or reducing restrictions without sacrificing any significant amount of realism.

The fourth and perhaps most important departure of all was due to the recognition that to centrally produce a plan which could be understood and implemented by refinery staff, it was essential that the plans be based on refinery capabilities and limitations as defined by refinery staff and approved by refinery management. Refinery personnel could not be expected to hold to a plan which was based on modes of operation which they had not issued or approved themselves.

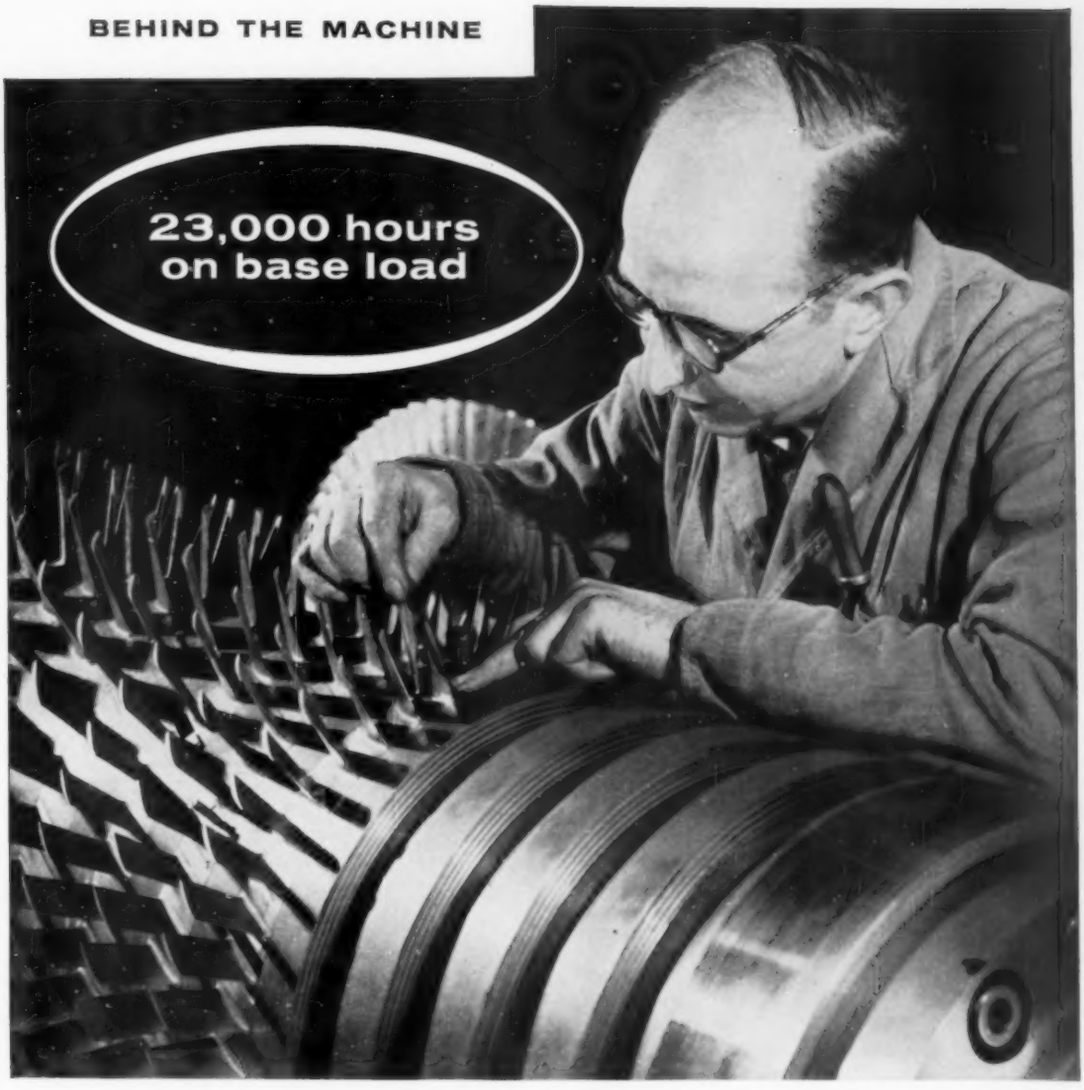
Recognition of this last principle is basically responsible for a revised system of data gathering, analysis and reporting which is currently in progress within the manufacturing department. Each refinery was requested to provide yield and associated quality data for each "boundary mode of operation" on each process unit, together with minimum and maximum limitations on throughput capacity. "A boundary mode" might be simply defined as that operation represented by the maximum or minimum potential yield of a particular product or product group which can be realized for an extended period of time, e.g. "minimum yield of middle distillate" on a crude unit or its equivalent "maximum potential yield of gasoline."

Once these boundary modes of operation were defined and approved by refinery management, they would provide a mathematical representation of refinery capability. This "refinery on paper" could then be subjected to optimization by Linear Programming and a plan produced and interpreted in terms of these basic operating modes which refinery staff had constructed.

The manufacturing operations control department required some reorganization both in refineries and head office to establish a structure for developing, coordinating, and up-dating these boundary modes of opera-

(Continued on page 58)

BEHIND THE MACHINE



The proved reliability of AEI industrial gas turbines is typified by a machine in Venezuela which has recently completed 23,000 hours running on base load. AEI makes a range of industrial gas turbines with ratings from 1,750 kW upwards designed to run on gaseous or liquid fuels.

The picture shows work on the compressor rotor of L2IC gas turbines being built, at the AEI Turbine-Generator Division Factory for the Basrah Petroleum Co. These feature a single shaft design which ensures stable regulation and makes them particularly suitable for parallel operation with other generating equipment.

This is a product of AEI Turbine-Generator Division, Britain's largest manufacturer of Turbine-Generators.

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B/L002

Growing Impact of the Compacts on Motor Fuels in the USA

(*Continued from page 52*)

The reasons for the growth in popularity of the compacts were probably best summed up by J. C. Ducommun, general manager of manufacturing, Standard Oil Co. (Indiana), who told WORLD PETROLEUM, "The compact car has filled an obvious gap in our automotive transportation needs. Its lower first cost, economy of operation, and maneuverability in traffic all add up to increasing sales."

Opinions varied as to the trends in sales of regular grade gasoline and as to the effects of cars on these trends.

"Regular grade gasoline continues to capture a larger share of the total gasoline sales, but probably not because of higher small car purchases," said Dan M. Krausse, senior vice president, and G. K. Chadd, chief chemist, Cosden Petroleum Corp. "We are currently approaching a figure of 70% regular, which is about 3% higher than in 1959. This trend should continue because of the increased emphasis on operational economy by manufacturers and the higher octane numbers now being offered by the petroleum industry on regular grade. We expect the nation-wide average on regular gasoline to increase by two research octane numbers by the end of 1962."

A somewhat different viewpoint was indicated by Sun Oil's John Moxey, Jr., assistant director of research and development for motor products, and Richard Fleming, assistant director, research and engineering, who said:

"While there has been some shift downward in 1960 in the percentage of total gasoline marketed represented by premium grade, this change has been minor. Actually, the public is, and has always been, surprisingly insensitive to the car manufacturers' recommendations as to the use of regular or premium fuels. In the early 1950's, for example, only about 10% of the cars produced recommended the use of premium gasoline. As the horsepower race developed during the mid-50's, this percentage grew to nearly 50% in 1957 and 1958. It has since dropped considerably, and we estimate a figure of 23% for 1961 models. In spite of this very drastic shift in car manufacturers' recommendations, the public has continued to buy very close to a constant percentage of premium gasoline. We would anticipate that the change will continue to be very small over the next few years."

Indiana Standard's Jesse Ducommun said his company estimates 1960 sales of regular grade will approach 73% of their total gasoline sales, compared with 71% in 1959. They expect the trend to continue, with the figure reaching 74% this year and 75% in 1962.

The outlook for the use of some of the newer types of motor fuel additives is not yet clear. There is a definite interest being shown by refiners, though many seem inclined to "wait and see." They feel the economics of the newer materials must be carefully studied.

One large southwestern refiner pointed out that new additives will always be used when an economic incentive and/or value to the automoble engine exists. The economic applicability of the new tetramethyl lead compounds depends on the lead levels, and the type of fuel composition involved, he said. This particular company has not made a final decision as to whether or not they will use straight TML or TML mixed with TEL.

K. E. Kingman, senior vice president of Union Oil of California, expects a general increase in the use of motor fuel additives. "The newer methyl types of lead compound apparently do have some advantages for certain refiners," he said. "They also have the appeal of novelty in some areas. Our company does not currently contemplate any substantial change in the use of gasoline additives."

Moxey and Fleming of Sun Oil pointed out that the new materials are more costly than traditional TEL at present. "Use of the newer materials will be decided on the basis of balance between potential benefit and the cost thereof," they said. "With the present cost differential, we would not anticipate any major shift to the new methyl compounds throughout the industry. . . . We have no immediate anticipation of any change. . . ."

Cosden's Krausse and Chadd expect the demand for anti-knock additives, particularly the new lead alkyl mixtures, to increase substantially; even though high octane blending components have become increasingly available to the motor fuel pool because of the virtual death of aviation gasoline demand.

Several trends in processing are seen by the industry. The use of such processes as isomerization and alkylation is seen by some authorities as being still well in the future. The slowing of the octane race, and the availability of new gasoline additives can be expected to give refiners time to delay installing processes such as these, which are aimed mainly at octane quality, according to Sun Oil. Cosden, on the other hand, "expects increasing emphasis by the industry on isoparaffins, derived from both alkylation and isomerization processes. These are important in maintaining a balanced fuel and offsetting some of the poorer characteristics of olefins and aromatics."

Cosden is of the opinion that hydrocracking processes are more significant to the refiner from the standpoint of adjusting his product distribution than they are in achieving higher motor fuel octane numbers.

Indiana Standard is currently expanding its alkylation capacity with the view of eventually including alkylation of hydrocarbons other than butanes. However, the necessity for C_5-C_6 isomerization expansion in the immediate future appears remote at this time, according to Ducommun. And down the road there appears to be a need for additional catalytic cracking within their system, he added.

There are no genuinely new techniques on the horizon with any particular appeal as means for improving the refiners' profit picture. The continued trend toward greater use of specific hydrocarbons to be blended into virtually tailor-made motor fuels points toward increased use of efficient chemical techniques to produce such components. There will in all likelihood be a growth in the use of separation methods such as molecular sieves.

The slowdown in the product demand and the tighter profits situation will keep all refiners busy watching for ways to improve efficiency of operations, new markets for existing products, and new products with greater margins of profit. For a further discussion of these aspects, see the article by V. B. Guthrie in this issue. END

How Computer is Used to Plan Refinery Operations

(*Continued from page 56*)

tion. In some cases these boundary operations had never been explored, which implied that special test runs would have to be made to establish reliable yield-quality relationships. Standard procedures were written, or are being written, to serve as a guide in the development of these modes and in conducting test runs.

The staff assigned to these activities soon began to question the reliability of our operations records system. As a result, some basic changes have been made and are still being made to improve the validity of this information, and to eliminate extraneous matter which was serving no useful purpose.

This emphasis on data gathering and its organization into meaningful concise modes of unit capability has contributed substantially to the practicality of the mechanized refinery planning procedure. By this means, the group directly responsible for producing these plans is kept up-to-date with latest refinery experience and can provide useful information in the resolution of day to day supply problems. This new emphasis also keeps the planning activity out of the back room—a greater part of the organization makes definite and continuous contributions to the planning activity.

The adoption of this method of planning by British American Oil has helped to provide economic guidance, improved efficiency, and increased understanding of refinery process operations as related to combined company operations. END

BIBLIOGRAPHY

1 "Economic Planning of Refinery Operations," H. V. Fullerton, K. C. S. Ltd., Graduate Seminar, Cornell University College of Engineering, Department of Industrial Engineering Administration.

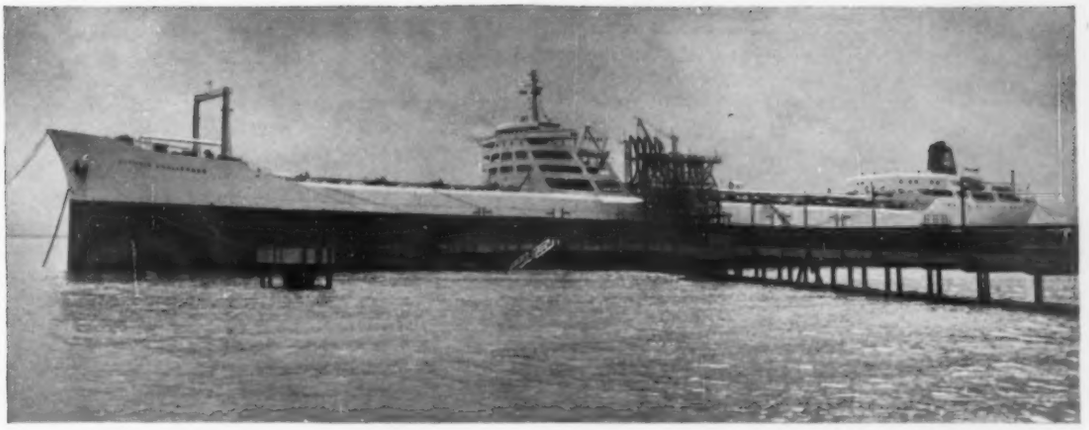
2 "Operations Research and Computers in an Integrated Oil Company," E. E. Sorensen, British American Oil Co. Ltd., and H. V. Fullerton, K. C. S. Ltd., Canadian Conference for Computing and Data Processing, University of Toronto, June, 1958.

3 "Planning Refinery Operations—an O. R. Case Study in a Canadian Oil Company," E. E. Sorensen, W. J. McGuire, J. R. Walter, British American Oil Co. Ltd., and H. V. Fullerton, K. C. S. Ltd.; written for inclusion in a new handbook on operations research, to be compiled by Dr. Melvin E. Salveson, Editor-in-Chief, 16 Parish Road, New Canaan, Conn.

4 "Problems Associated with the Implementation of Linear Programming Studies," B. A. Wilson and J. R. Jutras, British American Oil Co. Ltd., Canadian Operational Research Society, First Annual Meeting, May, 1959; and published in OILWEEK, March 19, 1960.

5 "A Simple Explanation of the Basic Principles of Linear Programming," N. A. Grundy, British American Oil Co. Ltd.; to be published.

6 "Techniques for Achieving Flexibility in Linear Programs Using a Medium Sized Computer," N. A. Grundy, British American Oil Co. Ltd., and P. Sandor, K. C. S. Ltd., Canadian Operational Research Society, First Annual Meeting, May, 1959.



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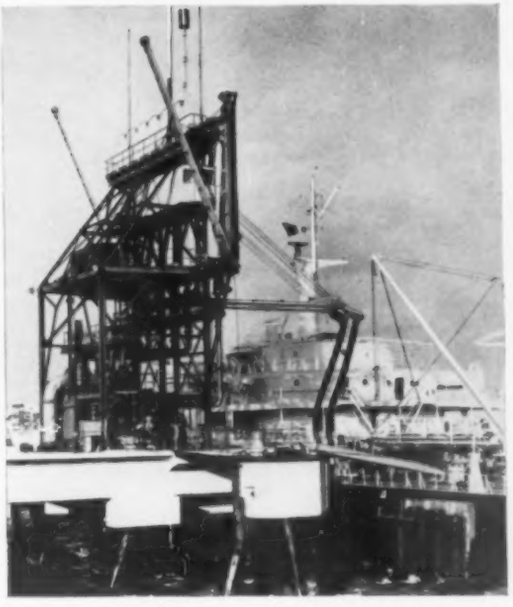
Top illustration: The "Olympic Challenger", 65,000 D.W.T. Super Tanker berthed at No. 10 jetty London & Thames Haven Wharves Ltd., Thames Haven Essex.

Left: View of Woodfield Flow Booms.

Lower illustration: Woodfield six-unit Flow Boom Equipment, one of three installations in operation at Wilhelmshaven for the Nord-West Oelleitung gmbh.



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U.K. Oil Industry—1960

(*Continued from page 47*)

(C) As a result of rising UK production (57,000 tons in 1959) and of increased imports of synthetic rubber, the proportion of synthetic to total new rubber being consumed in the country has gone up from 3.6% in 1954 to about 30.4% (i.e., 79,000 tons) in 1959. This proportion should continue to rise and it is quite likely that by 1970 synthetic rubber will have appropriated the major share of the total then expanded market. It has been suggested that the UK will be producing something like 190,000 tons of synthetic rubber in ten years' time; planned capacity so far announced exceeds 150,000 tons. (Mr. Chambers has confirmed to WORLD PETROLEUM that the last figure was reached before the announcements of the Shell Chemical and Esso Petroleum projects.)

(D) It has been estimated that the average growth rate on non-cellulosic fibers (the true synthetic fibers, derived predominantly from mineral sources) over the next ten years may lie around 11% per annum, bringing UK output from 38,000 tons in 1959 to some 135,000 tons in 1970.

(E) At present UK sales of synthetic detergents are some 300,000 tons of finished products a year, three times the 1951 figure; and the 1959 consumption of the organic surface-active agents, mainly based on petroleum, is put at 45,000 tons. Only a modest increase, however, is seen for synthetic detergents.

A pointer to the growth and national importance of synthetic rubber production is the fact that January-September 1960 exports were valued at £3.4 million against £2.2 million for the year 1959.

The notes which follow on individual projects are confined in the main to news released in the last six months; other major developments are known to be in hand but no progress reports have been issued.

British Hydrocarbon Chemicals Ltd. (50:50 British Petroleum and Distillers) will establish an entirely new petrochemical center on a site of several hundred acres near BP's Llandarcy refinery in South Wales. Initial investment may be £10 million and the general production pattern will follow that of BHC's 10-year old center at Grangemouth, Scotland.

British Petroleum Co.—Another development of great significance is the £7 million "BP California" project. A company is to be formed by BP and California Chemical Co. (Standard of California subsidiary) to build two plants in Europe to make aromatics. One will be adjacent to the BP Kent refinery, and each will have an initial annual capacity of 19,000 tons orthoxylene, 16,000 tons ethyl benzene and 22,000 tons paraxylene. Production is scheduled to start late 1961. California Standard is already associated with aromatic manufacture in the UK through Oronite Ltd.

Courtaulds Ltd. — A new "Courtelle" acrylic fiber plant based on petroleum with a cost believed to be between £2.5 and £3.5 million is to be built at Grimsby (Lincs.) even though a 10 million lb/yr plant of this type only went into production early in 1959. This should be in production early 1962.

Esso Petroleum Co. will construct a 30,000-ton/yr butyl synthetic rubber plant as an extension to the Fawley refinery at a cost estimated at £4.33 million. This is expected to take two to three years for completion and it is stated that its capacity will meet all UK requirements for a considerable period as well as giving a surplus for export.

A steam cracker with ethylene and butadiene extraction plants is being built at Fawley by Foster Wheeler Ltd. at a cost of £5.5 million. Completion is set for end-1961. This is part of a petrochemical feedstock expansion project which will also supply ethylene for delivery by pipeline to Imperial Chemical Industries' new petrochemical works at Severnside near Bristol.

Forth Chemicals Ltd. (66-2/3 British Hydrocarbon Chemicals and 33-1/3 Monsanto Chemicals), the largest UK manufacturer of styrene monomer, is currently completing its third expansion at Grangemouth, raising production capacity to 50,000 tons/yr. It has recently announced that a £3 million 50,000-ton/yr plant will be built in South Wales, next to the site chosen by British Hydrocarbon Chemicals as its new petrochemical center. Building will take about two years, with design and engineering by Monsanto. BHC will supply the ethylene and benzene will be purchased from outside sources.

Imperial Chemical Industries Ltd.—At Wilton and Billingham many of the Teesside plants of the Heavy Organic Chemicals Division are currently being modified to obtain substantially greater outputs and a start has been made at the new petrochemical center at Severnside (Gloucestershire).

An important recent announcement was that a Montecatini license had been acquired for the exclusive UK production of staple fibers, filament yarns and textile monofilaments from polypropylene. No information has been released as to plans but it was learned in mid-November that a 200-acre site had been bought at Kilroot in County Antrim (Northern Ireland) where a plant estimated to cost £5 million is to be built for the manufacture of "Terylene" and possibly other man-made fibers.

An earlier (1958) agreement covered the UK production of polypropylene under Montecatini/Ziegler patents for use as a plastic. This is termed "Propathene" by ICI and a 10,000 ton (20 million lb/year) plant at Wilton was understood to be going into commission early November, although no announcement had then been made. Associated with this is a new bulk plant for making organo-aluminum compounds for use as catalysts in this synthesis.

Expansion of the capacity of the three Wilton olefin plants for high purity ethylene from 120,000 to 140,000 tons a year is proceeding, with corresponding increases in the other products of these plants, and this will give larger feedstock supplies for both Wilton and Billingham units depending on the olefin plants. Acetone capacity, for instance, will go up from 28,000 to 36,000 tons/yr by mid-1961, and carbonylation plant output is being extended to cope with increased domestic and export demand for butanols and other higher alcohols.

The 30,000 ton/yr methanol plant at Heysham (Lancs.) is being expanded to 75,000 tons, with completion due in 1962.

"Rapid progress" was reported in October as being made with the Heavy Organic Chemicals Division's first two plants at the new works of Severnside. Costing £5 million, these will produce 35,000 tons/yr of ethylene oxide, ethylene glycol, and associated products, with completion due towards end-1961. Ethylene oxide will be produced by direct air oxidation of ethylene to be supplied by a pipeline now being planned from Esso Petroleum's Fawley refinery.

The second Severnside project will be a 100,000 ton/yr ammonia plant, with associated plants to make urea and fertilizers, estimated to cost £10 million and to be producing in 1963.

International Synthetic Rubber Co. Ltd.—The Hythe (Hampshire) plant was expected to have been raised to 85-90,000 tons/yr of lower solids latex by end-1960, mainly for tire manufacture, and it has been stated output may pass the 100,000 ton/yr mark by mid-1961.

In addition, the company has recently announced the start of production of high solids latex for foam rubber manufacture and the present capacity of 3,500 tons/yr is to be doubled in the near future. When the present minor extensions are completed an extra £80,000 will have been spent on the plant, which initially cost £6 million.

Shell Chemical Co.—The developments made at Carrington (Cheshire) since the facilities of Petrochemicals Ltd. were acquired a few years ago have recently been shown to the technical press for the first time.

An important development is the recent announcement that Shell International Chemical Co., London, and National Distillers & Chemical Corp., New York, are forming a joint company to develop plans for producing and marketing polyolefin film and plastic packaging materials outside the USA and Canada. No details of plans have yet been given.

Sto-Chem Ltd.—Under this title a new company has been set up recently by Witco Chemical Co. Inc. and United States Rubber Co. to acquire a 20-acre site at Stoke Prior (Worchestershire) and to build an 8 million lb/yr plant costing £1 million to make a wide range of synthetic rubber latices under a license granted by the Naugatuck Chemical Division of the United States Rubber Co. END

Pyrene TRADE MARK FOAM saves blazing tanker

3,000 GALLONS OF "PYRENE" FOAM COMPOUND FLOWN BY THE ADMIRALTY TO THE PERSIAN GULF

Action taken by the ROYAL NAVY

PHASE 1. 28th October, 1960. More than 3,000 gallons of "PYRENE" Foam Compound flown from Britain in three aircraft to Bahrein. More aircraft standing by to fly further supplies of "PYRENE" Foam Compound to the Persian Gulf if necessary. H.M.S. Dalrymple in charge of fire fighting operations. Intense heat and fumes adding to difficulties.

PHASE 2. 31st October, 1960. Latest reports from the Persian Gulf say that all fires have been extinguished. A blanket of "PYRENE" Foam is being maintained to stop re-ignition and H.M. Ships Bastion and Redoubt are cooling the ship down with water.

This is the story of how a Norwegian Tanker, loaded with 24,000 tons of crude oil caught fire in the Persian Gulf and was saved. The blazing ship—the "Polyana" was abandoned but two ships of the Royal Navy went to her rescue. Signals received at the Admiralty prompted immediate action and a command was issued for a bulk supply of "PYRENE" Foam Compound to be flown to the scene of the fire.

These reports show that once again "PYRENE" Foam has taken part in checking a dangerous major outbreak.

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INTERNATIONAL NEWS AND NOTES

ALGERIA—Tests of a natural-gas pipeline on the bed of the Mediterranean Sea between Algeria and Spain have solved technical problems in laying the line, according to Jean Jeanneney, French minister of commerce and industry. Economics of marketing the gas, and rights-of-way through countries, are yet to be worked out, he added. The tests, which started last May 22, have seen 7.9-in. steel pipe of one kilometer dropped into the sea. August 16 trials began with a pipe of the same diameter but three kilometers long at a depth of 600 meters, about 1,969 ft. More tests at deeper levels are planned in the next few months.

Bernard Kuhn de Chizelle, director-general of Gaz de France, has said the actual line would be 200 kilometers long at depths up to 2,700 meters, about 8,858 ft. He also said the final line would be 30 centimeters in diameter, about 11 in., and would consist of four parallel lines with a total capacity of 10 million cubic meters of gas a year. Speculation is that the line would run to Cartagena on the Spanish coast. Source of the gas would be the recoverable reserves estimated at 1,000 billion cubic meters at Hassi R'Mel in northern Sahara.

ARGENTINA—Tennessee Argentina SA (Tennessee Gas Transmission Co. subsidiary) plans to deliver 320,000 cubic meters of crude oil to YPF by the end of 1960. Starting October 1, the company planned to load one 16,000-cubic-meter tanker every five days at the Bay of San Sebastian with Tierra del Fuego crude oil. The loading is made possible with completion of a 14-in. and a 6-in. submerged loading line. First such shipment arrived at Buenos Aires August 29.

AUSTRALIA—Two wells have been drilled at Port Campbell, Victoria, by Frome Broken Hill & Co. Pty. Ltd.—with encouraging gas shows in the first. Location of a third test has been approved. With government subsidy, a private company continues to drill at Lakes Entrance, where 38 "bores" and one "shaft" have been sunk to date.

BURMA—Under a new agreement, the Burmese government will hold 51% in the Burmah Oil Co. Ltd. Previously, under a 1954 contract, it held only a one-third interest. During the next three years $6 million annually will be spent for exploration.

CEYLON—Ceylon Petroleum Co., a newly-organized firm, has signed a contract with the Russian government for 130,000 tons per year (about 2,600 b/d) of Soviet oil products to be delivered in Colombo at prices said to be 25% under those of private concerns. The company has leased tankage from the government at Trincomalee, and deliveries will begin as soon as arrangements for bunkering vessels have been completed.

CUBA—The "Warsaw," a new Soviet tanker rushed to completion in Leningrad ahead of schedule, recently left a Black Sea port for Cuba with 27,000 tons of crude. The vessel is the second in Russia's new 40,000-ton 18-knot class.

CUBA—Canadian and British businessmen have been attempting to increase trade with Cuba. Reportedly, the exchange of products now being considered is the purchase by Canada and Britain of sugar and gasoline and their sale to Cuba of machinery, spare parts, chemicals, and other materials—with an initial five-year contract.

EUROPE (Western)—Veedol International is a new corporation being formed to direct and expand the manufacturing and marketing subsidiaries of Tidewater Oil Corp. in western Europe—excluding Dansk Veedol now building a refinery in Denmark. With headquarters in Geneva, Switzerland, the new firm will also handle Tidewater's export operations in Europe, Africa, and the Middle East.

FRANCE—British Petroleum Co.'s French affiliate is negotiating with CFP and Antar for a refinery at Strasbourg, France (cost and capacity not yet known). A Shell affiliate also is planning a second refinery in the area.

GREECE—The Greek government has decided to create a "Hellenic Oil Co." under State control. The government agency would supervise oil research conducted in some parts of Greece by French and Romanian technicians.

GUATEMALA—Ohio Oil, Amerada, and Continental Oil have abandoned San Roman No. 1 because of high-pressure salt water encountered at 10,449 ft. According to Ohio, the operator, this is the second Guatemalan abandonment by the group—the first having been last April at 10,806 ft. Tentative plans for a third well are under way.

INDIA—Enrico Mattei, head of Italy's government oil agency **ENI**, has been invited by India's union government to visit New Delhi this winter, after a preliminary discussion in Rome between Mattei and S. S. Khera, secretary of India's fuel ministry. Assam and Kutch are reported to be the two potential oil-bearing regions in which **ENI** has expressed interest, but may be interested in others.

INDIA—Sparked by a 30% growth in diesel-fuel demand in the past 15 years, India is conducting a study of diesel fuel from low-temperature coal in the Raniganji fields of West Bengal.

INDIA—A government spokesman said the site of the proposed refinery to use Cambay and Ankleswar crude will be in Gujarat, and that the plant is scheduled for operation in 1963. He said also that, in addition to the ks. 115 crores earmarked for oil exploration in India's Third Plan, another Rs. 50 crores had been allotted for new refineries.

Erratum

The reference to India's new pipeline contained in our October issue, page 66, column 3, line 2 was incorrect. It referred to the 1st stage of the crude pipeline being constructed from Nahorkatiya field to "Roonmati." The first stage is being built from Nahorkatiya field to *Noonmati,* not "Roonmati."

INDONESIA—Newest Indonesian oil legislation (signed by President Sukarno but not as yet approved by the parliament) is contained within the draft of a proposed mining law which would cancel the petroleum production and marketing rights of three major oil companies in Sumatra and other parts of the island republic. If enacted, the law would cause grave concern to the companies which would lose rights they have held for 40 years if oil activities were placed under State control. The three companies are Caltex Petroleum, which in 1959 shipped 53 million barrels of crude from its fields in Sumatra; Standard-Vacuum Petroleum Co., and Shell Indonesia.

The government's plan though coached in ambiguous terms, apparently calls for negotiation of new contracts with the three concerns, which are to produce oil for the Indonesian government. The companies would be allowed to retain and market a portion of the output as payment. Government officials in Jakarta said details of the new arrangement haven't been worked out. A provision of the bill says foreign companies may be appointed as "contractors" for State companies. According to one oil spokesman, this "presumably means we will have to renegotiate our contracts."

INDONESIA—A cooperative pact signed by Romania and Indonesia provides for Romanian technicians to conduct an oil study in Indonesia.

INDONESIA—Newest Indonesian oil legislation is contained within the draft of a proposed mining law which would cancel the petroleum production and marketing rights of three major oil companies in Sumatra and other parts of the island republic. Though the law has not as yet been enacted, it could cause grave concern to the companies which would lose rights they have held for 40 years if oil activities were placed under State control. The three companies are Caltex Petroleum, which in 1959 shipped 53 million barrels of crude from its fields in Sumatra; Standard-Vacuum Petroleum Co.; and Shell Indonesia, which exported 31.5 million barrels of refined products in 1959.

The Indonesian government's plan, though couched in ambiguous terms, apparently calls for negotiation of new contracts with the three concerns, which are to produce oil for the Indonesian government. The companies would be allowed to retain and market a portion of the output as payment. Government officials in Jakarta said details of the new arrangement haven't been worked out.

IRAN—The new crude loading terminal on Kharg Island, 25 miles off the Iranian coast in the Persian Gulf, has been opened for oil tankers. Built during the past three years by the oil companies operating in Iran, the loading port is the terminus of a 100-mile land and submarine pipeline from the huge Gach Saran field in southern Iran—longest gravity-fed line of its size in the world. Berthing of tankers up to 100,000 tons is possible.

IRAQ—Crude production in the first eight months of 1960 in Iraq totaled 30,197,489 long tons—with Iraq Petroleum Co. accounting for 21,774,822, Basra Petroleum Co. for 7,553,443, and Mosul Petroleum Co. for 869,224 tons.

JAPAN—In the Sea of Japan, 950 ft. offshore the Kubiki gas field, an $830,000 eight-well platform, connected to shore by steel bridge, which will directionally drill 6,500-ft wells, was scheduled for end-of-November completion. The project is part of Teikoku Oil Co.'s program to supply gas to the Tokyo area.

LIBYA—Libyan Atlantic (Atlantic Refining Co. affiliate) is about to begin a six- or seven-month seismic survey of its large 6,700,000-acre concession in the Gulf of Sirte. With two boats outfitted in Malta, Geophysical Services Inc. will begin the work for Atlantic in the Bengasi area and work eastward. Atlantic's first test well in the area is scheduled for 1961 or 1962.

PAKISTAN—At Dasori, about 35 miles northeast of Hyderabad, a joint test by Pakistan Petroleum and Pakistan Sun Oil Co. will begin the middle of December. The new well on Sun's concession area was decided after extensive geophysical surveys.

PAKISTAN—At 13,000 ft and still drilling, Lalmai No. 2 is deepest test to date in East Pakistan. Karsal No. 4 has gone 11,814 ft, still drilling.

PAKISTAN—Pakistan Oil Fields Ltd., Rawalpindi, has obtained a three-year 100-square-mile oil-exploration permit in Jhelum and Attock districts. The company has also obtained a one-year 38-square-mile license in Campbellpur district.

PAKISTAN—Latest estimate of reserves in the Sui gas field of Pakistan is 4.8 trillion cubic feet, with latest consumption at 59 million cubic feet per day. Reserves are believed sufficient to last at least 70 years even were consumption to increase fourfold. Initially there were six wells at Sui—five for gas extraction and the sixth for observation. These wells were capable of producing almost 70 million cubic feet per day. A seventh well, started several months ago, has proved the best so far. More wells will be drilled as consumption increases; at least two are required for next year.

PAKISTAN—Crude production of 81,581,000 imperial gallons in 1959 constituted a 2.6% rise over 1958. Refinery output of 77,253,000 gal compared with 72,457,000 gal in 1958. The four major marketing companies registered combined sales of 518,927,879 gal in 1959 against 488,788,407 in 1958, indicating a 6% rise in domestic consumption.

PAPUA—Oil traces have been reported with resumption of drilling at the Iehi well in Papua from two relatively thin sandstone sequences, according to the operator, Australasian Petroleum Co. Pty. Ltd. The well has been deepened by 1,178 ft. At 5,790 ft, it was still drilling ahead. Testing of the sandstone in which oil traces were found will not be carried out until the well has been completed.

PERU—Peruvian Pacific Petroleum Co. has announced an underwater well completion under 130 ft of water on the ocean floor approximately one mile off the coast of northern Peru. Oil now flows from the well to a tank farm ashore, through a string of 3-inch-diameter aluminum pipe anchored to the ocean bottom.

Peruvian Pacific, a subsidiary of Cities Service Oil Co., in a joint venture with Richfield Oil Corp. first designed a Christmas tree which would function under 130 feet of water. Aluminum was chosen for flow lines because of its good weldability, ease of installation and

(Continued on page 64)

■ Engineering Teamwork at Work—
on 100,000 BPSD oil refinery in Germany

NEWEST RHINELAND REFINERY

A major contribution to West Germany's dynamic industrial growth is the giant new grass roots refinery of BP Benzin und Petroleum A.G. at Dinslaken. When fully completed, in 1961, it will increase the Republic's domestic source of gasoline, oil, and other petroleum products by 100,000 BPSD.

A huge and complex undertaking, this new refinery is the result of close coordination of effort among American, British, and German engineers. Each is making important and specific contributions to the over-all project.

Advisory and consultant services are being rendered BP in Germany on many phases of the undertaking by Kellogg Refinery Consultants, Ltd., Dusseldorf. These include procurement of materials and equipment, construction, operator training—as well as advice to BP Benzin und Petroleum A.G. on the testing and start-up of its refinery. Most of the materials and equipment have been supplied by German industry.

Fried. Krupp, Industriebau has worked closely with Kellogg on the project from inception through construction.

If you are planning to build new processing facilities at home or abroad, Kellogg would be glad to show you how its coordinated engineering-procurement-construction services could work to your company's economic advantage. Please address inquiries to The M. W. Kellogg Company, 711 Third Avenue, New York 17, N. Y.

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International News and Notes

(Continued from page 42)

strong resistance to sea water corrosion. Oil flows from well to storage area through a 3-inch line and a ½-inch aluminum line transmits hydraulic power to actuate the Christmas tree valves.

Richfield pipeliners welded each size line in two 3,250-ft lengths, using the inert gas shielded tungsten arc method. Two welding stations on the beach were in operation simultaneously. All pipe was roll-welded, and removable back blocks were used with the larger diameter line. Integral aluminum backing rigs were used with the ½-inch line.

As each 50-ft length was joined, a bulldozer pulled the string away from the stations, over a series of rollers. Launching the flow line from its position parallel to the water's edge through the surf was accomplished by an offshore boat which pulled the line through 90° of arc, using a curving row of guideposts planted firmly in the beach. Advantage was taken of aluminum's buoyancy and the pipelines were floated through the surf toward the wellhead location.

When in position over the well, the pipelines were flooded with water and submerged. A diver then anchored the system with concrete blocks installed at 50-ft intervals. A 10-pound aluminum anode was attached to alternate blocks as additional insurance against corrosion as the installation is the first for aluminum pipe in Peru's coastal waters.

PERU—Crude production in the first half of 1960 totaled 9,408,203 bbl and natural gasoline 532,853 bbl. Crude runs to stills at refineries came to 8,284,544 bbl—with output of products including 2,626,118 bbl of diesel oil, 2,432,712 bbl of motor gasoline, and 1,798,220 bbl of kerosine. Crude exports of 1,263,885 bbl went 890,782 bbl to the United Kingdom and 373,103 bbl to Brazil. Product exports came to 1,797,239 bbl—of which 978,806 bbl went to Chile and 447,259 to Central America, among others. Diesel oil constituted 808,948 bbl of the product exports; aviation gasoline 349,359 bbl, and kerosine 328,632 bbl.

Addressing the guests at commencement of work on South African Petroleum Refineries (Pty) Limited's refinery site, is councillor C. A. Milne, Mayor of Durban. Seated from left to right are Mr. W. S. Davidson, Chairman of the Isipingo Beach town board, Mr. W. J. Stok, general manager of the company and Mr. K. Firth, president of the Natal Chamber of Industries.

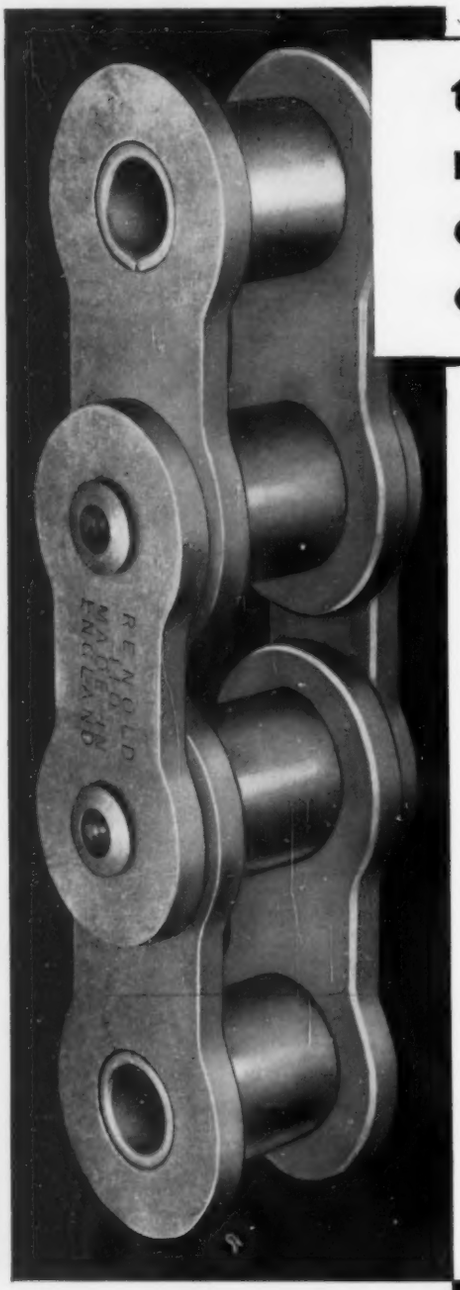
SOUTH AFRICA—Work on the site for South Africa's new £25 million refinery near Durban, premier port of the country, began November 4, 1960. The refinery will be constructed and operated by South African Petroleum Refineries (Pty.) Ltd., a company registered in South Africa, the shares being held jointly by The Shell Petroleum Co. Ltd., London and British Petroleum Ltd., London, on a 50/50 participation.

Chairman of the company is Mr. L. G. Abrahamse, managing director of the local board of the Shell Co. of South Africa Ltd.; general manager of South African Petroleum Refineries is Mr. W. J. Stok, previously of Bataafse Internationale Petroleum Maatschappij.

As far as possible South African materials and services will be used in the construction of the refinery. A contract for construction will be awarded in mid-1961 and it will come on stream at the beginning of 1964. Capacity will be between 60,000 and 80,000 b/d and products from the refinery will be distributed throughout the Union of South Africa, the surplus fuel oil production being available for export.

USSR—Near Mulymya in western Siberia, two step-outs to a discovery made early last summer have now proved to be producers. One had an open flow of 2,544 b/d of crude (compared with 220 b/d on discovery), and the other tested 436 b/d of crude with 176,000 cu ft daily of saturated gas.

USSR—Discovery of oil at Prorva, 155 miles southeast of Yuryev in Kazakhstan, is expected to revise upward the estimated reserves of the Emba and Caspian regions of Soviet Russia. A well flowed 82 tons daily of light-gravity crude through a 0.195-in. choke from 7,422 ft.



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If your drilling operations are excessively interrupted by chain failure . . . if premature wear necessitates too frequent replacement of drives . . . then fit

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British made to American specifications in single and multi-strand widths from .625" to 2.5" pitch.

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Petrie Appointed by Kellogg

The appointment of Mr. James A. Petrie, Jr. as assistant to the president has been announced by Kellogg International Corp., London. Mr. Petrie is a vice president and director of KIC in addition to being an assistant vice president of the M. W. Kellogg Co., New York.

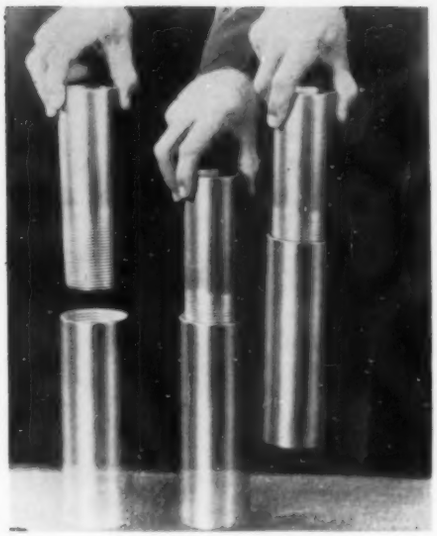
J. A. Petrie, Jr.

W. J. Funk

Funk Appointed at McKee

Appointment of William J. Funk as manager of foreign projects for the refinery division of Arthur G. McKee & Co. has been announced by H. E. Widdell, McKee president.

In his new position, Mr. Funk will be responsible for coordinating engineering, purchasing, inspection and construction of foreign petroleum projects with the exception of those in Canada and Mexico.



Threads Engage Without a Twist

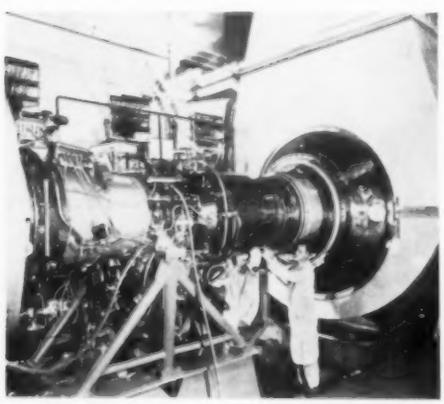
Multiple exposure of a small piece of USS National buttress-thread tubing being firmly placed in coupling to demonstrate its excellent stabbing characteristics. Tapered tubing slips easily into coupling until the flat crested threads engage. Without turning either piece in this photograph, the coupling was lifted from a table.

This feature permits faster make-up for maximum speed and lessens the possibility of cross threading and thread damage. It is designed to withstand at least 12 repeated make-ups and breaks without galling.

The new buttress-thread tubing is available in world markets through the United States Steel Export Co.

Reed Appointment

John Maher, president of Reed Roller Bit Co., has resigned and Ray O. Shaffer, chairman of the Board, temporarily will assume the additional duties of president and chief executive officer, Mr. Shaffer said. Both Mr. Maher and Shaffer became officers of Reed in August, 1958. Mr. Maher will remain on the Reed Board of Directors, and has resigned as president in order to devote full time to his ranching interest in South Texas.



The forerunner of a new family of stationary power units employing aircraft jet engines is prepared for a test run at the Willgoos Turbine-Engine Test Facility of Pratt & Whitney Aircraft at East Hartford, Conn. Technicians complete installation of a P&WA J-57 jet engine, which supplies power to a power turbine (background) developed by the Cooper-Bessemer Corp. of Mount Vernon, Ohio. In the first installation at Clementsville, Kentucky, the 10,500-horsepower unit burns natural gas as it pushes natural gas through the transmission lines of the Columbia Gulf Transmission Co. The J-57 engine is the primary aircraft powerplant of the U. S. military forces, and powers most of the Boeing and Douglas jetliners now in world wide airline service.

Dresser Electronics

Dresser Electronics is a new division which has been set up by Dresser Industries Inc. to handle the electronics activities of two Dresser subsidiaries, Southwestern Industrial Electronics Co., Houston, and Hermetic Seal Transformer division, Garland, Texas. Name of the Houston unit will be changed to Dresser Electronics, SIE division. The subsidiary now combines activity in developing seismic and geophysical equipment and instrumentation. Hermetic Seal Transformer will become Dresser Electronics, HST division, and will continue manufacturing specialized transformers and the development of a variety of core-wound magnetic devices and electronic subsystems.

Sonic-Caliper Log

Schlumberger Well Surveying Corp. has combined its widely applicable Sonic Log with a Caliper Log in a single, simultaneously recorded operation. The combination results in increased logging efficiency and lower costs. The Caliper Log is valued as an aid to interpretation of the Sonic Log. In particular, when viewed together with the Sonic or other open hole logs, it helps to identify those formations which are permeable. Savings to the operator include a reduction of rig time expended in the logging operations.

Bennett Joins Dresser Electronics

Dresser Electronics, SIE Division, has announced that Roy F. Bennett has joined the firm as assistant to President George A. Peck. This is a new position established to foster cooperative research and development work by industrial and governmental agencies in earth-science fields. Mr. Bennett, most recently a petroleum exploration consultant in Oklahoma City, was chief geophysicist and foreign exploration manager for Sohio Petroleum Co. for fifteen years. Prior to these duties he had been with geophysical contracting companies for thirteen years.

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The addition of cuttings deflectors to the face of Hawthorne's patented replaceable blades . . . to substantially reduce plugging between formation layers . . . gives the driller considerable versatility with drilling weights . . . which in turn results in faster hole . . .

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298

OIL COMPANY STAFF CHANGES

H. S. M. Burns

M. E. Spaght

Dr. J. McAfee

J. O. Rundle

MONROE E. SPAGHT has been elected president of Shell Oil Co. to succeed **H. S. M. BURNS**, who will retire at the end of this year. Mr. Spaght, who started his career with Shell as a research chemist, has been an executive vice president since 1953. Before that, he was president of Shell Development Co., Shell's research affiliate.

Mr. Burns became president of Shell in 1947. During his term of office the company's annual revenues have risen from $600,000,000 to over $1,850,000,000. He has been active in the petroleum industry and in civic and cultural affairs, serving as a director and chairman of the American Petroleum Institute, president of the Fifth World Petroleum Congress, a trustee of the National Safety Council, National Fund Chairman of the American Red Cross, and a director of the New York Philharmonic Society.

W. J. (JEFF) GREER has been appointed manager of exploration for Delhi Australian Petroleum Ltd. He was promoted to this position from his job as staff geologist for Delhi-Taylor Oil Corp., Dallas, Texas. Mr. Greer was division geologist with the U. S. Smelting, Refining and Mining Co. prior to his employment by Delhi-Taylor. Mr. Greer will be headquartered in Adelaide, South Australia.

ROBERT J. RIGGS has been promoted to foreign sales representative in export sales of Ethyl Corp. He will be responsible for sales of Ethyl products in Europe and the Far East, with the exception of Japan. Mr. Riggs has been with Ethyl Corp. as a chemical engineer in refinery technology in the research and development department, and most recently as a refinery technologist in the sales department's southern region.

ALEXANDER B. CLARKE, who has been manager of the manufacturing department of The Standard Oil Co. (Ohio) has been named vice president, manufacturing. Mr. Clarke joined the company in 1941 as an engineer in technical service following his graduation by Purdue University with a B.S. in chemical engineering.

W. LEWIS PERRYMAN, JR., has been elected president of General American Oil Co., Dallas, to succeed Gordon Simpson, retired. Mr. Perryman joined the company as an attorney in 1949 and was made a vice president in 1957. Vice presidents elected include the following: W. P. Barns, F. H. Connally, and L. P. O'Neill. Senior vice presidents: N. W. Krouskop, vice president, production; J. M. Haas, vice president, engineering; George Rhodus, vice president, administration; and J. W. Gross, vice president, land.

THOMAS W. MOORE has been named vice president for supply and transportation, a new post, by Humble Oil & Refining Co. He has been vice president and member of the board of management of the Esso Standard division in New York.

Joining Esso in 1934 as an engineer at the Bayway (N. J.) refinery, Mr. Moore was named assistant to the general manager of East Coast manufacturing operations in 1946, and assistant to the general manager of manufacturing in 1948. In 1953 he became assistant general manager of the supply department.

He moved to headquarters of Standard Oil Company (N. J.), parent company of Humble and Esso, in 1954 as assistant manager of the coordination and petroleum economics department. He has also served as a director and vice president of Esso and of Esso Export Corp.

DR. JERRY MC AFEE, formerly vice president, engineering for Gulf Oil Corp.'s manufacturing department has been named to the newly created office of vice president, executive technical advisor. On a world-wide basis, Dr. McAfee will report to Gulf's top management the results of technical studies concerning a variety of company activities. Additionally, he will serve as top management's personal technical representative in preliminary discussions and evaluations of various technical proposals, maintaining a flow of information to the company's chairman of the board and president concerning the status of projects under investigation and recommending specific courses of action.

DALLAS R. LAMONT, vice president of research was elected senior vice president in charge of research and engineering of Socony Mobil Oil Co., Inc. In addition to research, he will be responsible for the engineering and operations analysis, process promotion, and products department. Mr. Lamont succeeds **ARTHUR V. DANNER.** Mr. Danner became president of Mobil Petroleum Co., a new operating division which will be responsible for Mobil's business interests in the Far East, Australasia, and Eastern and Southern Africa. Mr. Danner has also been elected an executive vice president of Socony Mobil.

THRAY SITHU U BA HTAY, I.C.S. (retd.) became chairman of the board of directors of Burma Oil Co. (1954) Ltd. on October 11. The company is a joint venture of the Government of the Union of Burma and Burmah Oil Co. Ltd.

H. F. VAN DER VOORT has been promoted to general manager of marketing for Continental Oil. Formerly marketing manager for Conoco's Rocky Mountain region, he will make his new headquarters in Houston.

GEORGE H. OLIVER has been appointed manager of liquefied petroleum gas operations for Mobil International Oil Co.

J. L. LATIMER, senior vice president of Mobil Oil Co. and chairman of the board of Magnolia Pipe Line Co. retired Jan. 1 after 45 years of service. One of the best known men in the oil industry, he was president of Magnolia Petroleum Co. from 1946 to October, 1959, when Magnolia was combined with Mobil. Mr. Latimer will continue as a director or trustee of numerous Dallas-based firms, research groups and civic associations.

JOHN H. CLEARY, JR., has been appointed senior counsel for Mobil Chemical Co., an operating division of Socony Mobil Oil Co., Inc. Mr. Cleary joined Mobil Oil Co.'s office of general counsel in 1956, as counsel for the petroleum chemicals department. He had been with Union Carbide Corporation.

T. W. Moore

J. H. Cleary, Jr.

JOHN O. RUNDLE, a veteran of 33 years in the oil well drilling industry, has been appointed drilling advisor for the Gulf Oil Corp. In this position he will be available to the exploration and production departments of the company and its subsidiaries for counsel and assistance on drilling matters on a world-wide basis. Mr. Rundle will be based in Gulf general office in the Gulf Building, Pittsburgh.

RUDOLPH W. EDMUND, who has been general manager of the exploration department of The Standard Oil Co. (Ohio), today has resigned to rejoin the faculty of his alma mater, Augustana College. Dr. Edmund joined Sohio in June, 1953, as staff geologist; became assistant general manager for production in 1956; and general manager for exploration in 1957, with headquarters in Oklahoma City, Oklahoma.

HAROLD G. OSBORN has been elected chairman of Continental Carbon Co., Houston. Mr. Osborn is senior vice president of Continental Oil Co. and will continue in that capacity while serving as chairman of Continental Carbon Co. He succeeds **ROBERT I. WISHNICK,** chairman of Witco Chemical Co., Inc., who will continue as an active member of the Continental Carbon Co. board in the United States, as well as of the boards of Continental subsidiaries which are now building carbon black plants in France and Japan.

R. E. HOWE, executive vice president of Sinclair Refining Co., New York City, has been elected to the Board of the Western Petroleum Refiners Association to fill the unexpired term of Mr. T. B. Kimball, former president of Sinclair Refining Co., who was recently named executive vice president of Sinclair Oil Corp.

J. BYRON ECKERT has been appointed regional executive for North Africa, France and Spain of Mobil International Oil Co. to succeed Arthur G. Reed, retired.

After joining the Mobil organization in 1926, Mr. Reed held posts in Egypt, Lebanon, Morocco, Algeria, France, and the United States. During World War II he served as vice-consul and petroleum attaché at Allied Headquarters in Algiers. He was awarded the United States Medal of Freedom for this assignment.

Returning to Mobil in 1944, he was named general manager for French North Africa and in 1946 moved to Paris as chairman of the management committee.

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On the city's most famous thoroughfare, 5th Avenue in exclusive Washington Square. Spacious single rooms from $10 daily. With air-conditioning from $12-$14. Lavish 2 & 3 room apartments with serving pantries. Television available.
SPECIAL RATES on a monthly basis. Additional substantial savings, on unfurnished and furnished apartments on lease.
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24 FIFTH AVENUE at 9th STREET

In 1947 he was transferred to Socony Mobil headquarters in New York.

Mr. Reed was made a chevalier of the French Legion of Honor for his work in helping to rehabilitate the French oil industry after World War II.

Mr. Eckert joined Mobil in 1948 and became general manager of the Mobil affiliate in Syria in 1954. When the United Arab Republic was formed in 1958, he was named general manager of Mobil affiliates in both Syria and Egypt.

TURNER L. KUNKEL has been appointed Los Angeles producing division manager of Texaco Inc., to succeed J. Harold Puls, who will retire January 1. Mr. Kunkel has been chief geophysicist of Texaco's Exploration Division at Houston, Texas, since 1957. He will be succeeded in that position by Dosh T. McCreary, formerly assistant chief geophysicist.

C. G. Drescher

CARL G. DRESCHER has been designated coordinator of foreign market development, Sinclair Oil Corp., and will coordinate the foreign sales efforts of Sinclair subsidiaries and their associates and representatives, with particular emphasis on Venezuelan crude and products.

DONALD Y. McCOY has been appointed eastern division marketing manager and a member of the division advisory committee, Tidewater Oil Co. He succeeds **ROBERT G. REED III**, recently appointed assistant division general manager.

DALLAS E. HAWKINS, II, has been elected a director of Fargo Oils Ltd. Mr. Hawkins joined Fargo Oils Ltd. in April, 1956, as general manager and was elected vice president of the company in April, 1958. He will continue to administer his duties as vice president and general manager. Fargo Oils Ltd. is an active Canadian independent oil company with extensive production and land holdings throughout Western Canada.

DR. LEO J. PETERS, formerly a vice president and associate director of Gulf Research & Development Co. (Harmarville, Pa.), Gulf Oil's research subsidiary, has been promoted to the newly created office of vice president and general administrator of GR&DC. In his new position, Dr. Peters will be responsible for the day-to-day operations of the laboratory. He will report to Dr. Blaine B. Westcott, executive vice president of GR&DC.

LUCIEN CRAIG, who was 25 years with Gulf Oil Corp., has opened an office for Craig Associates in the Landmark Building, 1343 H Street, NW, Washington 5, D. C., to offer public affairs services. Mr. Craig, who has been in the oil industry since 1916, and served in several liaison positions between industry and the government, spent his last six years with Gulf as the firm's Washington representative. He reached retirement age a year ago.

C. D. OWENS, Jr., has been named director of personnel for Sinclair Oil Corp. and its subsidiaries. Mr. Owens joined Sinclair at Tulsa, in 1949 and became manager of industrial relations for Sinclair's producing subsidiary in 1957. For the past year he has been a member of Sinclair's industrial relations department in New York City.

L. J. HOAR has been named executive vice president and director of marketing of Sinclair Refining Co. **ROBERT E. HOWE** was named executive vice president and coordinator-petrochemicals and research, and **W. VAUGHN ISCHIE** was named executive vice president and director of manufacturing. The executive staff of Sinclair Refining Co. was further expanded by the election of **R. M. COOPER** as a vice president and director and general manager of refineries. **E. W. GRISCOM**, vice president, has been named director of transportation, supply and distribution, and **G. G. WELLING**, also a vice president, has been appointed general manager of transportation, supply and distribution.

JOHN E. KIRCHER, Houston, has been promoted to general manager of Continental Oil Co.'s southwestern region, with headquarters at Fort Worth, Texas. Formerly executive assistant to the senior vice president of Continental, he succeeds W. O. Ham, Jr., who recently was elected a company vice president following his transfer to Houston as general manager of the domestic exploration department.

M. J. RATHBONE, president of Standard Oil Co. (New Jersey), has been reelected to his second term as chairman of the board of the American Petroleum Institute, and **FRANK M. PORTER**, president of Fain-Porter Drilling Co., Oklahoma City, Okla., was reelected president. The new vice presidents chosen are: **GAGE LUND**, Standard Oil Co. of California, San Francisco, vice president for production; **VERNON A. BELLMAN**, Mobil Oil Co., New York, vice president for marketing; **A. P. FRAME**, Cities Service Co., New York, vice president for refining; and **A. O. SAVAGE**, Standard Oil Co. (New Jersey), New York, vice president for finance and accounting. **HENDERSON SUPPLEE, JR.**, The Atlantic Refining Co. Philadelphia, was reelected vice president for transportation. **P. C. SPENCER**, Sinclair Oil Corp., New York, was reelected Institute treasurer, and **WILLARD M. WILSON** of the Institute staff, New York, was reelected secretary.

RAYMOND C. LASSIAT

Raymond C. Lassiat, 63, engineering consultant to Sun Oil Co. on catalytic oil refining methods, died suddenly on November 13. Mr. Lassiat was widely recognized in the oil industry as a leading authority on catalytic processes.

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Vee-form diesel engines for drilling rigs and associated power requirements.

Air-cooled units 100 to 610 b.h.p.

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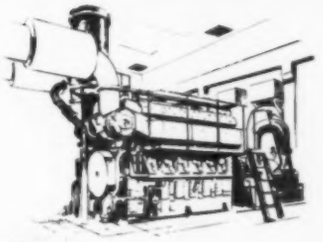

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P.O.8

NEW PUBLICATIONS

"Geology of The Industrial Rocks and Minerals," by Robert L. Bates; cloth; 442 pages; illustrations, tables and charts; geographic and general indexes; published by Harper & Bros.; New York (1960); $10. In Harper's Geoscience Series, this volume is the first to treat the nonmetallics on a strict geological basis rather than a technological one. Thirteen rocks and twenty minerals are described. The major subdivisions are industrial rocks and industrial minerals; under each, the breakdown is genetic. Dr. Bates (now with Ohio State University, editor of *Journal of Geological Education*, writer of the column "Geology in the Public Eye") has worked as geologist for Texaco. He has assembled information heretofore inconveniently scattered throughout the literature. Since this volume is largely a compilation, he has made liberal reference to sources (a total of 1,087 times).

"Energy And Man"—A Symposium; Cloth; 115 pages; illustrations; published by Appleton-Century-Crofts Inc., New York (1960); $3.75. With an introduction by Courtney C. Brown, formerly of New Jersey Standard and now dean of Columbia's Graduate School of Business; contributors include historian Allan Nevins on "Energy in the History of Western Man"; Sun Oil Co.'s president Robert G. Dunlop on "The Petroleum Revolution"; thermonuclear scientist Dr. Edward Teller on "Energy Patterns of the Future"; Harvard economics professor, Dr. Edward S. Mason on "Low-Cost and Abundant Energy"; and consulting engineer and former State Department advisor Herbert Hoover, Jr., on "Energy and Public Affairs." The symposium on November 4, 1959, where these authors were contributors was co-sponsored by Columbia and the American Petroleum Inst. as part of the latter's centennial activities.

"Asphalts And Allied Substances"—Their Occurrence, Modes of Production, Uses in the Arts, and Methods of Testing, by Herbert Abraham; cloth; 370 pages; illustrations, tables, and charts; bibliography and references; author, subject, and patentee indexes; published by D. Van Nostrand Co., New York (1960); $10.75. This is Vol. 1 of the new, completely revised, and up-to-date sixth edition of this authoritative reference guide first published 40 years ago. The 6th edition covers the same range of subjects as the previous edition, but for convenience has been divided into five volumes. Vol. 1 covers historical review and natural raw materials Vol. 2 will cover industrial raw materials; 3, manufactured products; 4 and 5, methods of testing. Domestic and foreign technological developments occurring since the last edition have been included.

"Prospective Oil and Gas Areas of The United States"; edited by Arthur Troutman; 108 pages; paper-covered; published by Oil Center Tool Co., Houston, Texas (1960)—with a preface by W. A. Wolff, O-C-T president. Copiously illustrated with maps and charts, this is a series of abstracts and references to 33 published articles which is offered, says the editor, as a "panorama covering some of our vast undeveloped oil and gas areas of the continental U.S." He poses the problem (and hopes for its solution) by pointing to 1959, when our average U.S. well produced only slightly over 12 b/d—compared, for example, with Middle East producers of 20,000 b/d and more. "Only our tremendous domestic demand . . . has enabled us to hold the line to date. For the sake of economic survival, we need the kind of flush production that can come only from new discoveries of considerable magnitude."

The First Big Oil Hunt—Venezuela, 1911-16, by Ralph Arnold, George A. Macready, and Thomas W. Barrington; published by Vantage Press, New York (1960); $10. With 23 contributors and compiled by Mrs. Edna O'Quinn, this volume is profusely illustrated with photos and maps. In the foreword, Dr. Carlos Perez de la Cova (minister-counselor for petroleum affairs at the Venezuelan embassy in Washington, D. C.) says: "Dr. Arnold is to be complimented for the accomplishment of such an interesting work that will enrich the literature of world petroleum history." In a letter to Dr. Arnold, Herbert Hoover says: "Such a book will be of great interest to all that great number of people upon whose activities you touch."

Union Oil Company of California Statistical Report for 1959, designed to meet requirements for more detailed information on the history and operations of the company than is practical to include in the annual report to share owners. May be obtained by writing the comptroller's department of the company, Union Oil Center, Los Angeles 17, California.

Recent Sediments, Northwest Gulf of Mexico, The American Association of Petroleum Geologists has published a monograph based on an eight-year research project financed by the American Petroleum Institute. The volume summarizes a study of the nearshore Holocene sediments and their environments in the northwest Gulf of Mexico. The project was conducted by the Scripps Institute of Oceanography between 1951 and 1958. The book may be obtained from the American Association of Petroleum Geologists, P. O. Box 979, Tulsa, Okla., at $6.00 per copy.

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The 48,800-ton supertanker "Esso Boston" underway for Baton Rouge, La., to load 228,000 barrels of crude oil and 80,000 barrels of fuel oil. The 740-foot vessel was launched September 28, following her sistership, the "Esso Baltimore," by exactly five months. The two ships were the 38th and 39th built for Esso Standard by the Newport News Shipyard in the last 47 years.

Transcontinental LPG Line

Transcontinental Gas Pipe Line Corp. has formed Trans-Southern Pipeline Corp. to build and operate a $63 million 1,080-mile Houston-to-Danville (Va.) pipeline for carrying initially 60,000 b/d of LPGas, first line for such service in the Gulf Coast-to-Southeast area.

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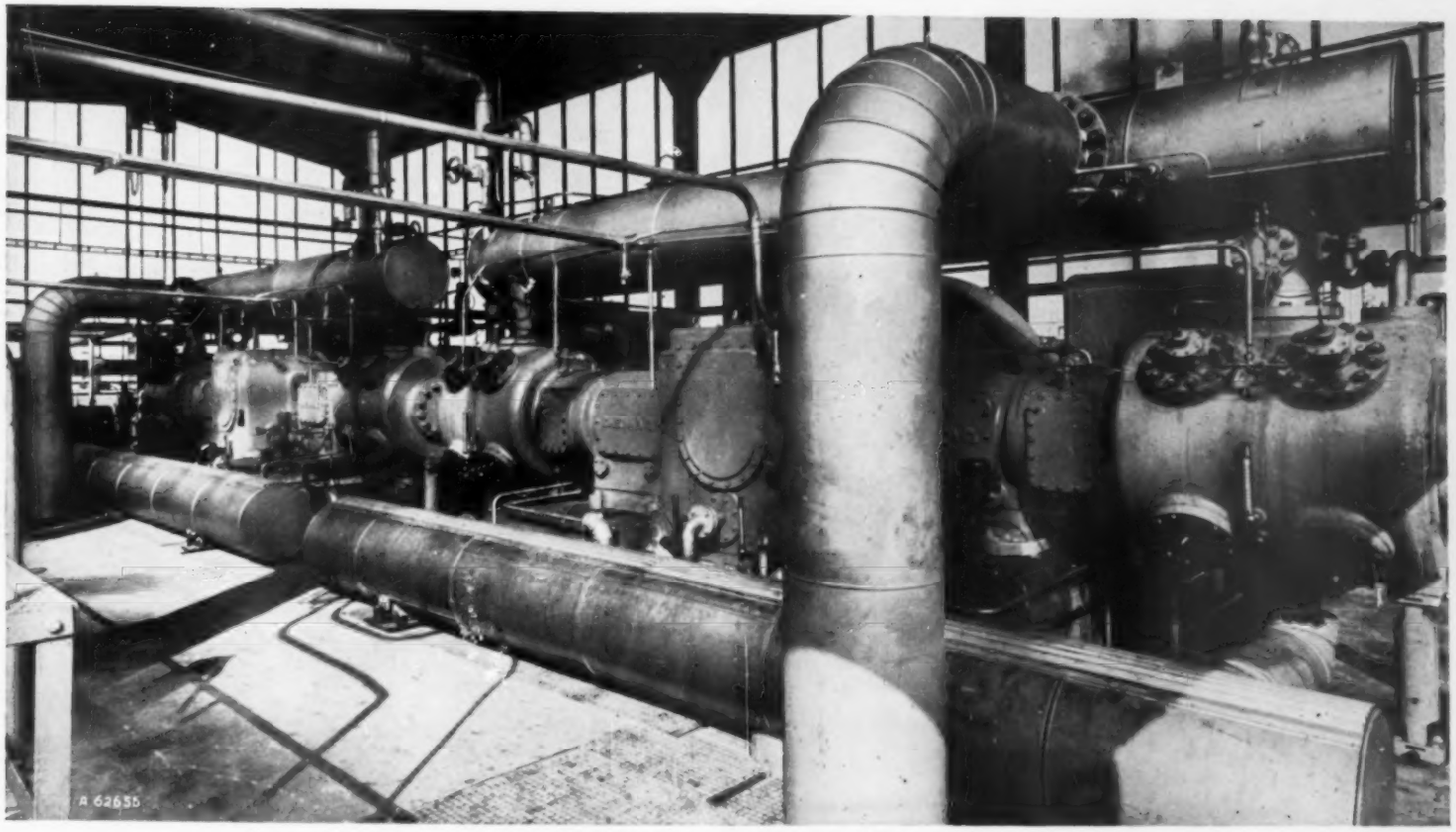

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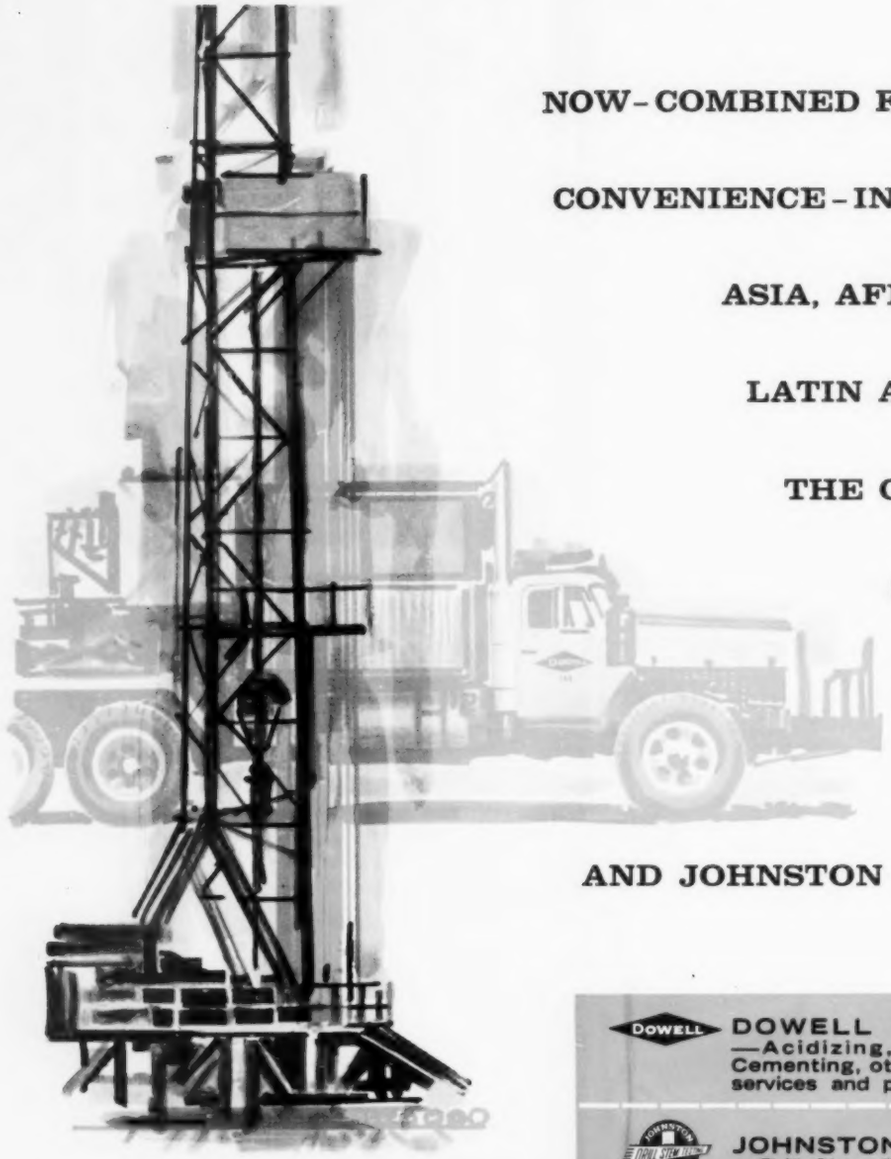

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